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the OIL AND GAS JOURNAL

NOVEMBER 10, 1958

PRE API NUMBER

DOWN THE LINE FOR '59

. . . and beyond

How Journal editors view the immediate and long-range prospects for oil p. 109

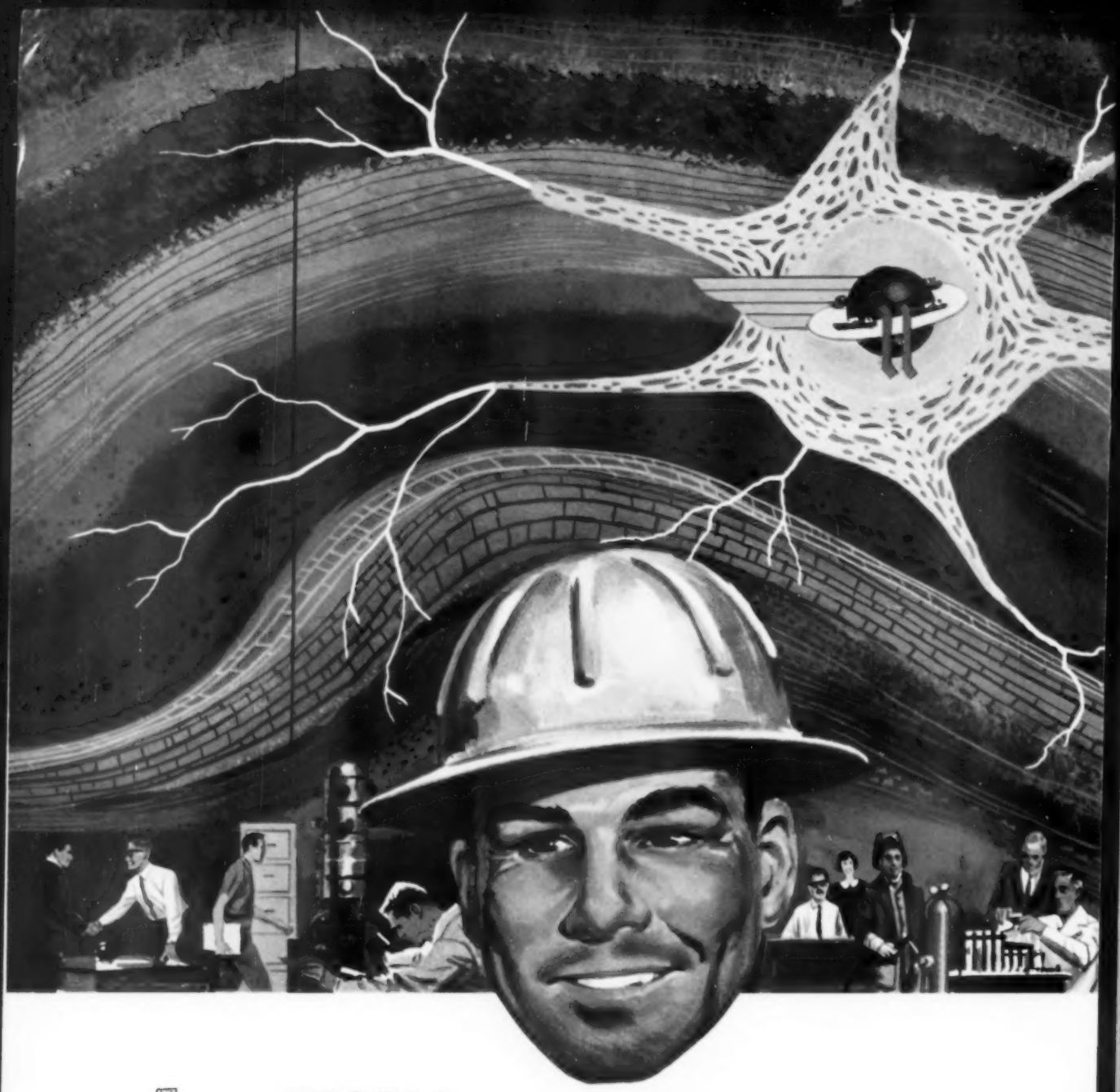
API meeting opens today in Chicago p. 83

How 1959 cars will affect refiners p. 90

How to determine absorber effectiveness p. 117

Segregated feed stocks charge reformers p. 153

Lucero basin: New Mexico's newest prospect p. 207



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DUNCAN, OKLAHOMA

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Nov. 10, 1958

Pay raises to Chicago drivers won't set a pattern for oil:

Top management of integrated oil companies is not changing its no-raise policy for 1958, even though some big oil firms were involved in the Chicago Teamster negotiations.

Result of these 3-months' of bargaining is a 10-cent hourly raise offer for drivers on tank trucks for 300 firms in the Chicago area. Settlement of other issues is expected soon.

Insiders say the Chicago agreement with the Teamsters resulted from many factors not present in oil management's dealings with other unions.

A few:

...Drivers in other Chicago industries, the dry-cargo haulers, already had won a 10-cent raise. Tank-truck drivers in sections of the East and West Coasts also had been raised.

...Many small, independent dealers were represented on oil's side at the bargaining table. Teamsters are their main work force. The independents were in no position to take a strike which was threatened.

...Historically, there has been no correlation between pay scales for Teamsters and those of unions in the oil industry. Even in the past, raises for one haven't meant automatic raises for the other.

Oil management's position still is clear:

Pay raises aren't justified by industry economics. Despite signs of an upturn, factors which forced oil firms to hold the line on wages this year still persist.

Prices are still soft. Other costs still are high and rising. Profits are still depressed.

▼ ▼ ▼

Looking ahead, you can chart your business course on these trends compiled by Oil and Gas Journal editors:

Demand will be up 3.9% for all products in 1959. Domestic crude production will rise to 7,235,000 bbl. daily. Refinery runs will exceed 8,000,000 bbl. daily. Domestic consumption of petroleum will average 3.6% yearly gains and gas 5.5%.

Drilling will show substantial increases in next few years to produce needed reserves. Total of 53,000 to 55,000 wells is indicated for 1959. Cost-cutting will be big goal. Look for more emphasis on faster drilling rates, multiple completions, and use of automation on the rig.

Exploration may see a new cycle of discovery within 5 years. The oil finders are reexamining their old tools and techniques for new ideas and approaches.

Pipeline construction will continue high. By 1965, the industry will build 56,000 miles of gas-transmission lines, 20,000 miles of crude lines, and 22,000 miles of product lines.

Refining construction for basic crude capacity is slowing down but still will increase by 1.4% in 1959. Downstream units for product quality, however, will show greater gains.

▼ ▼ ▼

Look for industry pressure to build up for a modernization of Texas' conservation laws.

Prime target will be closing present loophole in Rule 37. It allows an operator to drill a well on a pint-sized tract if the area were subdivided prior to discovery of oil or gas.

A few operators now appear to be making a career out of taking advantage of this.

A recent instance:

One operator was permitted to drill a 12,000-ft. gas well on a ½-acre tract in a Gulf Coast field. The location was so small he had to demolish two houses and rent adjoining land to get an area large enough to accommodate a rig.

The ½-acre tract is surrounded by acreage in a 320-acre spacing unit and is within 1,000 ft. of two other such units. Other operators figure they may have to spend up to $1,500,000 in drilling unnecessary wells (at about $300,000 each) to minimize drainage from their acreage. They also stand to lose about $2,000,000 worth of gas to the maverick well over its life.

But even worse, the same operator has a permit to drill another 12,000-ft. well on a 2-acre tract in the middle of a 320-acre spacing unit just to the east.

▼ ▼ ▼

Postings for Oklahoma sweet crude will settle down eventually, but right now they are the most confusing in the country.

Seven separate price levels exist for the moment. Top prices range from $2.81 to $3.15 a barrel and three different differentials have been set up for the lower gravities.

One thing now seems sure. Oklahoma producers are going to get less for their crude. Competitive forces among the buyers and sellers will determine how much the cut is.

Other crude areas also are feeling price cuts. Esso has cut Arkansas and North Louisiana crudes by 5 to 15 cents, and Sohio has made cuts ranging from 10 to 20 cents in same area. Quaker State has cut price of Pennsylvania-grade crude in Allegany field by 8 cents.

▼ ▼ ▼

First use of remote control at a gas-engine reciprocating compressor station is being made by Texas Eastern at Linden, N. J.

This breakthrough on the toughest pipeline-control problem will accelerate automation in gas transmission. Several months of trial runs have proved the new satellite reliable (p. 96).

Agreement by Iran and Turkey on 1,000-mile pipeline to the Mediterranean looks more political than economical.

The accord opens way for building a system capable of carrying 500,000 bbl. daily from Iran to a Turkish port. The tentative plans call for branches to Qum area in northern Iran and to Abadan. About 550 miles of line would be in Turkey.

The two countries got together after the latest Middle East scare. There is little chance for construction to start soon. Reserves in the Qum area still are a big question and a branch to southern fields alone would be in a poor competitive position with tankers now working at low rates.

▼ ▼ ▼

Here's a more specific report on gas-production trouble in area of Oklahoma Panhandle (Newsletter, Nov. 3).

Wells showing rapid declines which threaten payout are in Mocane and Laverne areas of Beaver and Harper counties.

Other fields apparently are not involved, and trouble even is spotty in Mocane and Laverne.

The declining wells produce gas from the Chester and Morrow sands alone. And even some of their offsets which also produce solely from these formations show no signs of fading.

Chester and Morrow wells in the fields which also have production from other formations, especially the Hoover, are holding up.

The general Oklahoma Panhandle area is one of the hottest oil and gas exploration regions in the country, with established production from 12 separate zones.

Midwestern Gas Transmission has a two-part proposal to serve the upper Midwest gas market, replacing the one rebuffed by FPC few weeks ago.

Midwestern proposes two separate projects. One would serve Chicago-Gary area with gas from Gulf Coast. Other would serve Minnesota, Wisconsin, Michigan, and North Dakota

region with Canadian gas. Previous plan combined facilities to serve this entire region into one project (p. 94).

Excess flaring of gas in Utah's Aneth area may result in proration of crude production there.

This plan is advanced by many operators as a substitute for the Government's order to shut in production until the gas can be handled.

Other operators favor a delay in the shutdown until El Paso Natural can complete its facilities to move the gas (p. 88).

▼ ▼ ▼

Excellent gasoline demand—unseasonally high for mid-October—is helping correct gasoline stocks.

Total gasoline demand for the 2-week period ended October 24 averaged about 4,260,000 bbl. daily. This represents an increase of about 8% over the average for the full month of October last year. Result is a 2-week drop in gasoline stocks amounting to 4,500,000 bbl.

Special importance of these withdrawals is location.

More than 70% of the stock drop was in PAD District 2 where stocks have been running high compared to last year.

Marketers can expect oil's best customer, the military, to use less in this fiscal year's second half.

Demand in first half hit around 750,000 bbl. daily. But this represented heavy orders for inventory replacement to offset previous year's budget cuts.

Second half buying will average 710,000 bbl. daily with heavy declines in navy special and avgas.

One big reason why 1959 auto models haven't moved upward generally in compression ratios is the leveling off of the octane race by refiners.

The oil industry eased up in its own private octane battle this year. Outside of California which caught up with the rest of the country on octanes, little if any increase has been recorded since January.

Detroit is reluctant to put out cars that require octanes not already available at the nation's gas pumps.

▼ ▼ ▼

Unique storage cavern will be dedicated at Sun Oil's Marcus Hook, Pa., refinery this week. It's nation's first granite cavern for underground storage of LPG.

New cave is 300 ft. below the surface and will hold 250,000 bbl. of butane. Sun engineers estimate facility will cut costs of storing butane by as much as 50 to 80%.

The Sun project may kick off a new trend to mined storage projects.

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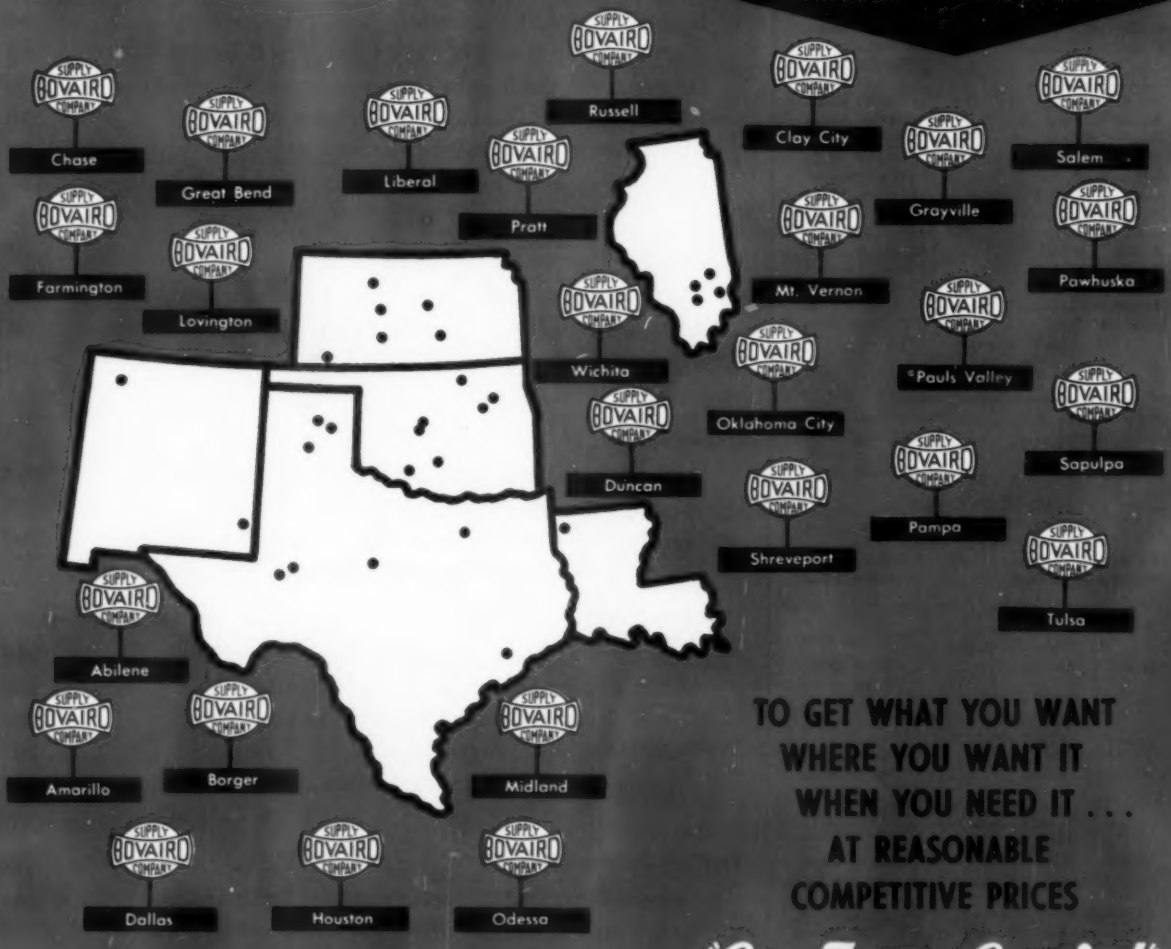

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SPECIAL ECONOMIC REPORT

General Outlook 109
Demand will be up 3.9% for all products in 1959. Through 1965, domestic consumption of petroleum will gain at an average rate of 3.6% yearly and gas at rate of 5.5% yearly.

Exploration 112
A new cycle of oil discoveries may start developing in this country within the next 5 years. Back of this prediction is a movement among oil finders to re-examine old ideas and explore new ones for a fresh approach.

Drilling 114
Cost of a foot of hole may come down in next few years based on move toward faster drilling rates, more portable new equipment, multiple completions, and automation on the rig.

Pipelining 115
By 1965 pipeliners must build 56,000 miles of gas-transmission lines, 20,000 miles of crude lines, and 22,000 miles of products lines in this country.

Refining 116
A timely leveling off is the prospect for refining capacity next year with a slowdown in building of new crude units. But other plant construction—especially downstream units—will still climb to keep pace with demand for high product quality.

TECHNOLOGY—OPERATION

Drilling-Production

New Course in Blowout Prevention Scheduled 124
By Ed McGhee
Thirty-two midstates centers will be the locations for a new program to train oil-well-drilling personnel in control of blowouts.

V-Type Mud Pumps for Greater Drilling Power 130
By William R. Barry
This design was employed to get higher operating speeds and pressures. Higher speeds should mean higher driving efficiency at a lower cost. Higher pressure should permit faster drilling.

Three Ways to Cheaper Drilling and Production 140
By Harry Pistole and M. E. True
Smaller hole diameters, multiple completions, and unitized production facilities are the methods. Workover and artificial-lift problems in small-diameter wells have been largely solved.

Pipelining

Safe Welding on Gas-Filled Pipelines 135
By J. S. Powell and H. M. Curtis
Southern California Gas Co. tests show that air should be purged with gas before welding is done, practice of "drifting gas" does not prevent air from entering the line, purging should be done through a bottom opening, and controlled-fire welding is safe only if welder progressively "muds" behind cut.

Progress Report: Multiphase Flow in Pipelines 156
By Ovid Baker
Pressure drops in two-phase flow are often 10 times as great as would be expected when dealing with single-phase flow. Even small amounts of liquid in a gas line can reduce efficiency to 80% or less.

Refining-Processing

Absorber-Tray Effectiveness in Propane Recovery 107
By Edward G. Ragatz
Data developed from the analysis of over 500 tests on 175 commercial absorbers clearly reveal wide difference in the tray effectiveness of currently operating columns.

Process Costimating 148

Segregated Feed Stocks Charge Two Cat Reformers 153
By Larry Resen
Phillips Petroleum Co. uses one reformer for low-end-point charge and one for high-end-point material at its Sweeny, Tex., refinery.

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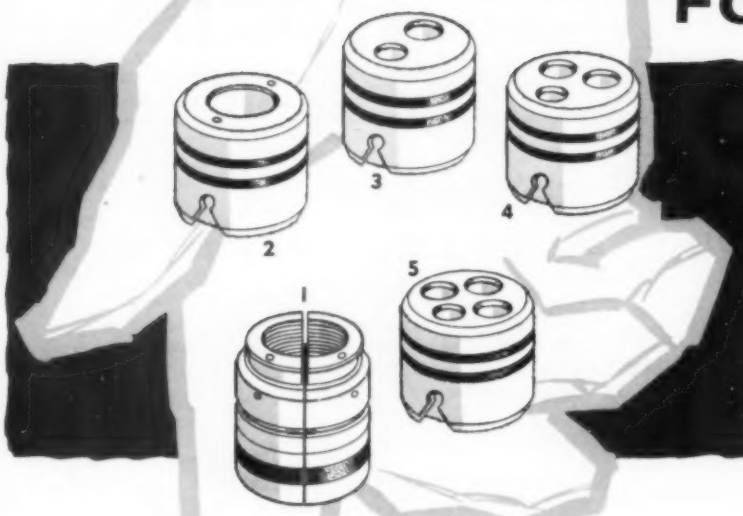

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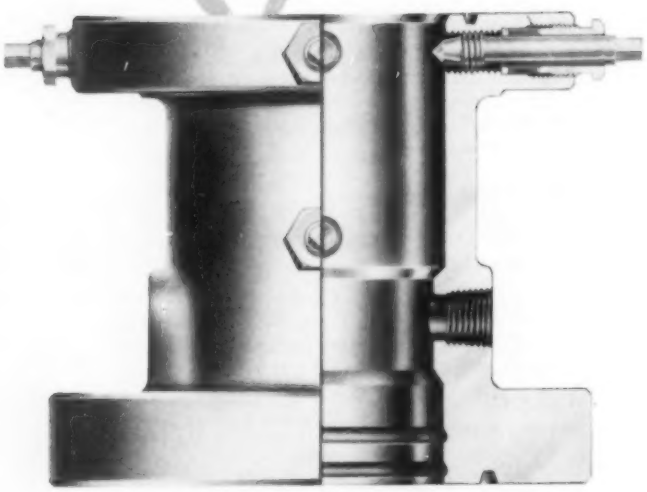

Cutaway of the C-19-U Head shows retractable aligning pins 90° from outlets.

Whether anticipated or not, multiple completions can pose problems in the selection of wellhead equipment.

The C-19-U Head is truly "universal" . . . to the extent that it need not be removed regardless of the number of productive zones found.

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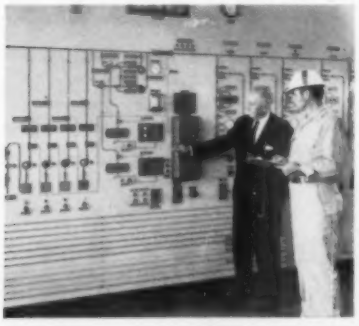
To help you meet this rapidly growing blending problem, the Du Pont Petroleum Chemicals Division now offers consultation service on continuous on-stream blending.

Trend to automation

The petroleum industry has always been a leader in the trend toward automatic processing operations. Now, the adoption of continuous blending is a step in the direction of straight-through handling of all refinery products, and elimination of the need for intermediate storage.



Graphic control panel for a continuous automatic gasoline-blending system.

What you gain

In comparison with *batch* and *partial* blending methods, the *continuous on-stream* method offers many advantages. Refiners who are now using the automatic continuous method report that they are successfully realizing all or most of the following benefits:

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3. Elimination of quality giveaway
4. Blending closer to ultimate specifications
5. Reduced loss of light ends
6. Flexibility in maintaining inventory in base stocks
7. Lower power costs
8. Reduced inventory of TEL and other additives in finished gasoline
9. Simplification when accounting for the butane shrinkage factor
10. Greater safety

To help you

If you are considering setting up either a partial or completely automatic continuous blending procedure at your refinery, we believe it will pay you to consult with Mr. B. Gardner Crane, of our Petroleum Chemicals Division.
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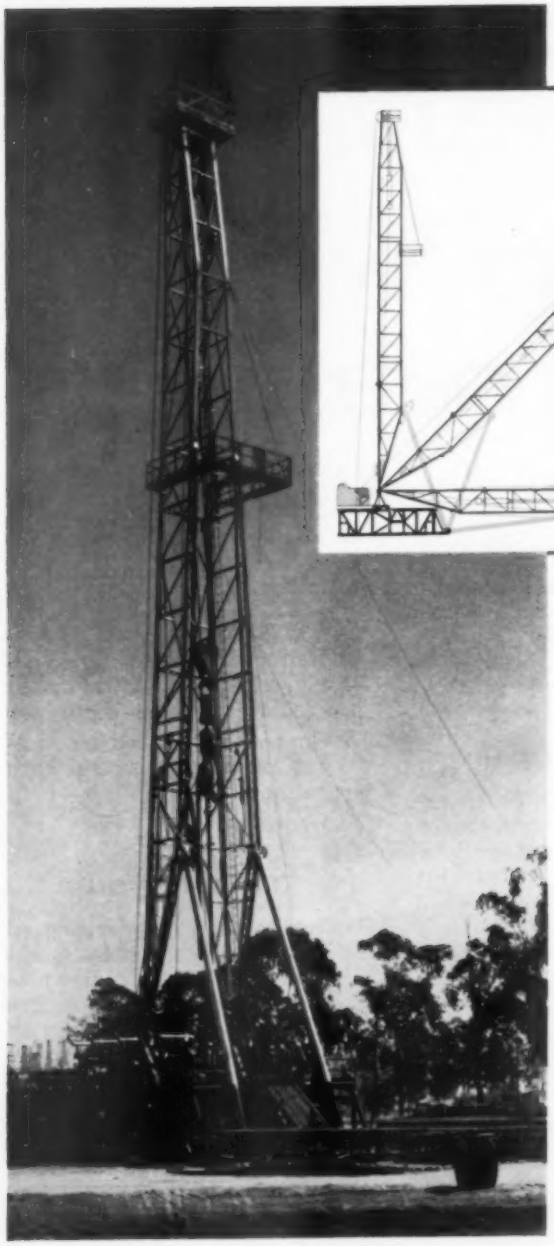

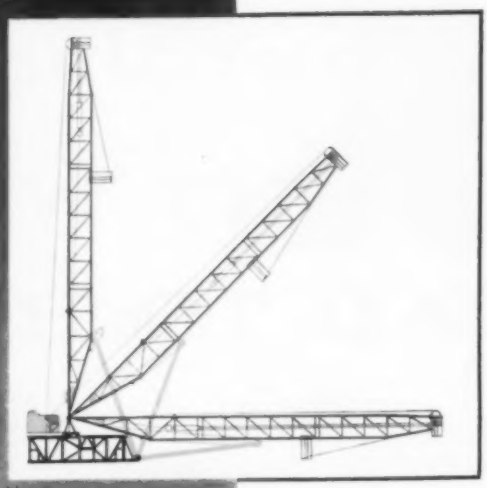

Look at this schematic drawing!

See how the lifting power from the draw works is first applied through the wire line system at a point near the center of the mast while in horizontal position . . .

. . . and how this power, using leverage principles, pushes against the front legs until the mast reaches an upright drilling position—approximately one degree from vertical.

The lifting levers then lock into place with an automatic wedge-type mechanism and become the front legs of the mast—an integral part of the unit.

. . . and note these design features

1. Main tower consists of five sections which may be transported on two semi-trailers and one truckload.
2. Sections are assembled at ground level by means of "T" bolts and patented built-in wedge-lock fasteners which tighten in use.
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4. Snubbing is unnecessary. An overtravel stop makes it impossible to pull this mast over backwards.
5. Patented cross-over crown block assembly, with fast line and dead line outside the mast, equalizes leg loading. It also permits stringing the traveling block with flat side facing and fast line away from the derrickman.
6. Eccentric hinge pins in each leg facilitate centering and leveling of the crown block.

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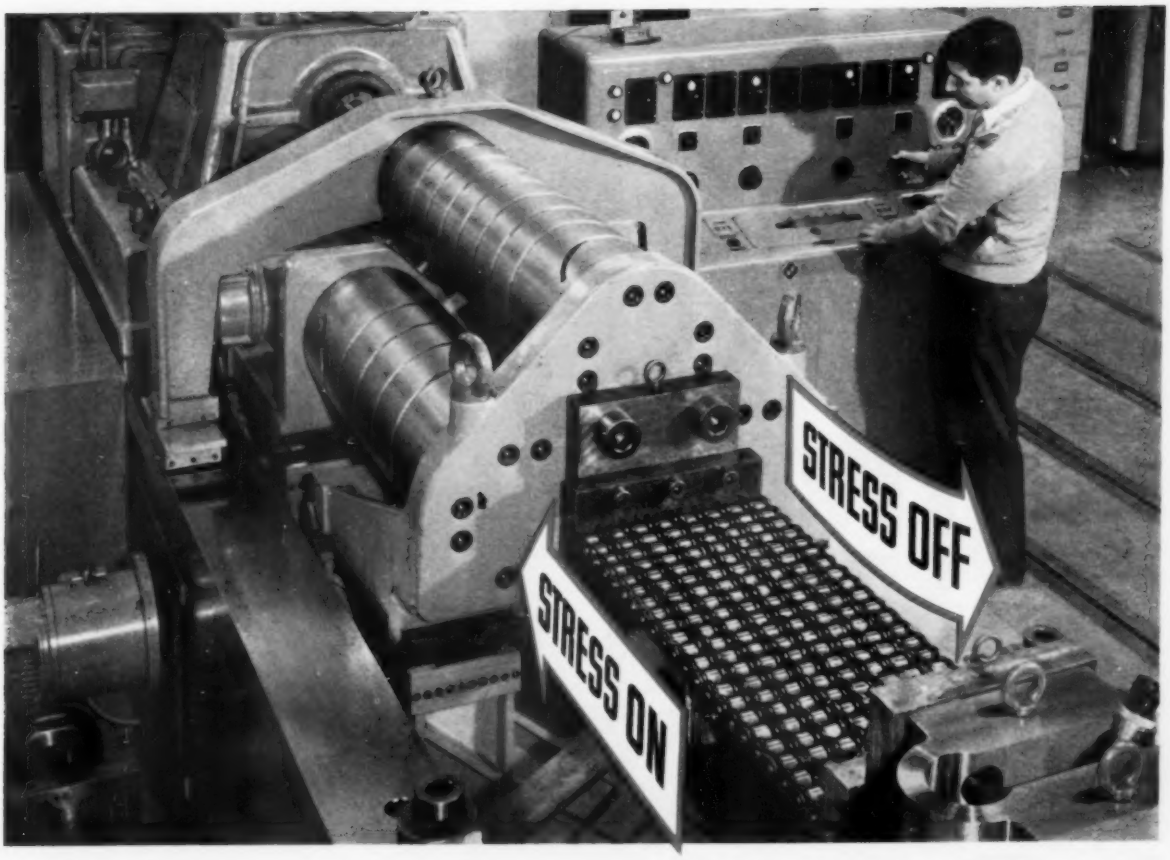

65 tons of cyclic tension

Lab test proves the unexcelled *fatigue strength* of LINK-BELT roller chain with FR. FATIGUE RESISTANT

The equipment you see here—largest of its type known to be in operation in roller chain testing—enables Link-Belt to test and rate the largest-pitch, multiple-width chains used on today's drilling rigs. Its rapid "stress-on, stress-off" action duplicates the toughest conditions of rig operation at a greatly accelerated pace. It proves conclusively (see chart) the superior *fatigue resistance* imparted to roller chain by the FR process.

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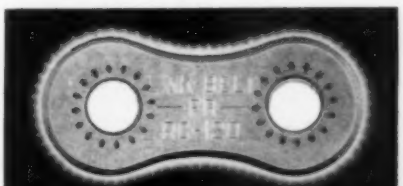
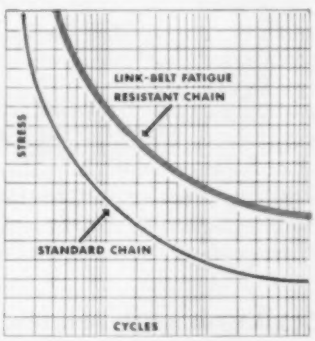


U.S. Patent No. 2,517,497

THIS IS FR. By compressing metal around pitch holes, Link-Belt greatly strengthens the critical sidebar areas most vulnerable to fatigue failure and greatly increases the chain's *dynamic strength*



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ROLLER CHAINS & SPROCKETS

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GOOD TIME FOR HARD LOOKS

at needless chlorine costs

Columbia-Southern's manufacturing and servicing experience with quality chlorine may help you achieve appreciable savings on former costs. Isn't this the ideal time to see if your chlorine purchase and use practices aren't costing more than necessary?

Let's take the *quantity* of chlorine you are currently buying and handling. Is your operating volume most economically adapted to tank car, barge, ton tank, or cylinder delivery? Are you quite sure that new or projected changes in your products or processing won't change this picture? Do you have all the facts on completely up-to-date unloading techniques and equipment?

Let's look at the uniform *quality* of the chlorine you are receiving. Here again, Columbia-Southern can advise you with recognized authority as the country's leading merchant producer. As a matter of record, we have led in developing such vital improvements in chlorine transportation as the fusion-welded tank car, the 55-ton single unit car, the safety-dome platform, the industry's first large capacity barge fleet for inland waterways delivery, and other user economies or safety features.

Our well-grounded Technical Service specialists, too, have helped customers save on needless chlorine costs. One valuable aid, for example, is their extremely thorough yearly inspection of your unloading, storage, and use operations. Isn't it simple good business, especially now, to see what savings they might work out for you? You may request their services either through our Pittsburgh address, or any of the fourteen Columbia-Southern District Sales Offices.

The Columbia-Southern Chemical Corporation, One Gateway Center, Pittsburgh 22, Pennsylvania. Offices in principal cities. In Canada: Standard Chemical Limited.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION A Subsidiary of Pittsburgh Plate Glass Company

News about

B.F.Goodrich Chemical *raw materials*

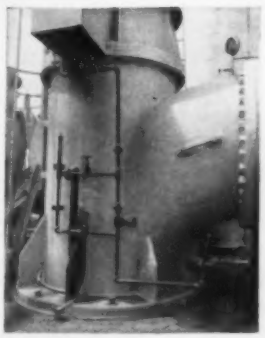
AT FLORIDA POWER & LIGHT'S CUTLER GENERATING STATION

How pipe of Geon helps cut maintenance

The large photo shows 3½" pipe made from Geon rigid vinyl material that is used to feed an aqueous solution of chlorine into sea water just ahead of bar screens at the intake structure. The chlorine prevents buildup of algae in condenser tubes and in the circulating water system.

The smaller photo shows more pipe of Geon circulating salt water to cool the bearings of circulating water pumps. Geon is not affected either by salt water or most chemicals—which proves its value in still another part of this large generating station.

Geon is used to pipe the acid bearing (H_2SO_4) wash-down water from the boiler waste hopper to the discharge canal. Geon piping is used also for pumping salt water to the soot disposal collectors.



Geon pipe and conduit also provide high impact and tensile strength. Both are lightweight, easy to install. They are examples of the way that versatile Geon provides the key to new and improved products or applications. For information, write Dept LL-6, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

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9TH NATIONAL
PLASTICS EXPOSITION
NOV. 17-21
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B.F.Goodrich

GEON polyvinyl materials • HYCAR American rubber and latex
GOOD-RITE chemicals and plasticizers • HARMON colors

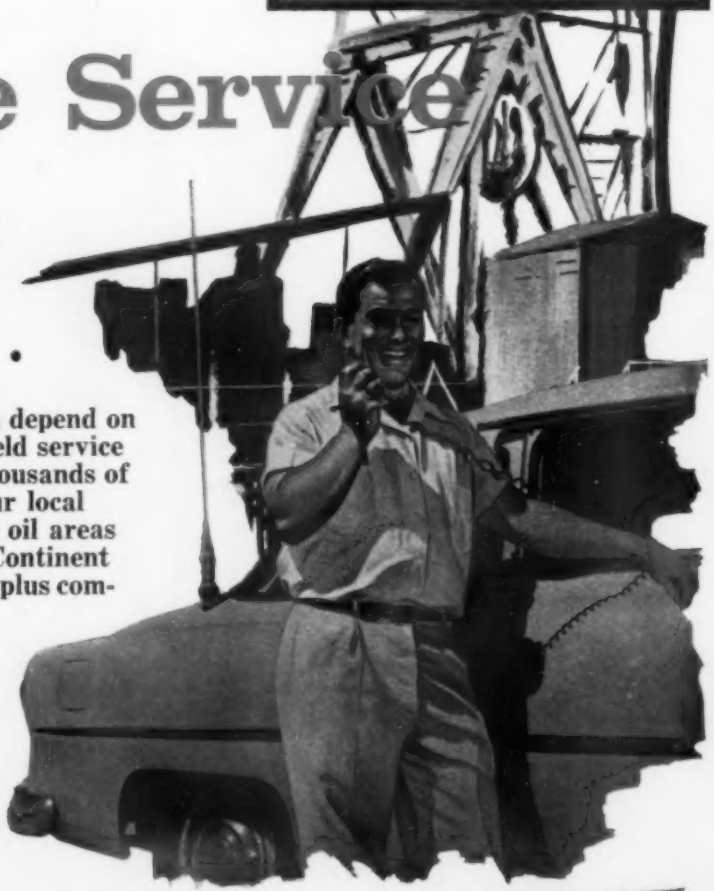
Rope...

Rotaries...

Rigside Service

from Mid-Continent where and when you need them....

Around the clock . . . you can depend on Mid-Continent for prompt field service in supplying your rig with thousands of items carried in stock at your local Mid-Continent field store. In oil areas throughout the world, Mid-Continent has experienced personnel . . . plus complete stocks of top-quality products . . . to help oil operators and drilling contractors keep rigs running at maximum efficiency. Visit your nearest Mid-Continent Field Store, or call your local Mid-Continent representative.



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Export Division: 45 Rockefeller Plaza, New York 20, N. Y. Cable: MIDCUMPORT NYK

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

THE RW-300

is the first digital computer for automatic process control and data logging

The Ramo-Wooldridge RW-300 Digital Control Computer is available *now* to control process units in oil refineries, chemical plants, and other process industries.

The new RW-300 offers outstanding opportunities for higher profits from existing and future plants—through reduced operating costs, increased throughput and yields, and improved product quality. These benefits will pay back an investment in an RW-300 digital control system within six months to two years.

For technical information on automatic process control and advanced data logging with the RW-300, write: Director of Marketing, The Thompson-Ramo-Wooldridge Products Company, P.O. Box 45067, Airport Station, Los Angeles 45, California, or call OSborne 5-4601.

API members are invited to discuss computer control with us at the Conrad Hilton, Nov. 9-12.

THE THOMPSON-RAMO-WOOLDRIDGE PRODUCTS COMPANY

Primary Objective...

The primary objective in cementing casing is:

- **To protect and conserve all possible productive zones**
- **To protect against corrosion of casing**

Casing must be adequately surrounded with cement for effective bond to casing and formation. Many factors enter into the desired "end-result", requires proper planning and preparation for a successful primary cementing operation.

Facts that must be considered before primary cementing begins are:

- **Selection and placement of the correct tools**
- **Selection and location of surface connections that affect cementing**
- **Materials for cement slurry must be carefully decided upon**
- **Proper mixing units, accessory equipment and techniques must be chosen**

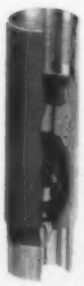
Only qualified and experienced personnel with the "know-how" and "know-why" can perform successful cementing jobs.

Halliburton's background of 34 years of oil well cementing experience... of more than 2,000,000 jobs performed, make Halliburton the world's most experienced oil well cementing organization... specify Halliburton for the best Primary Cementing.

HALLIBURTON PRODUCTS ..."FIRST" FOR BETTER PRODUCTION

AUTOMATIC FILL-UP FLOATING EQUIPMENT

Double-action Float Collar and Float Shoe have orifices that "meter" the flow of drilling fluids while running casing. Saves running-in time of casing, minimizes damaging pressure surges, converts to Super Seal floating when tripped with moderate increase of circulating pressure and volume using conventional rig pump. Guides your casing easily to bottom because of liberal radius provided by more durable nose guide of high strength concrete.

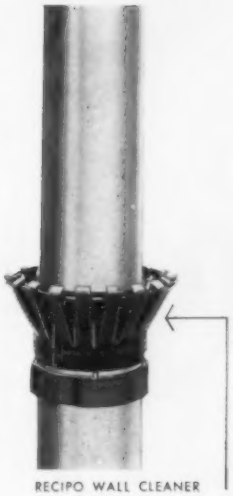


AUTOMATIC FILL-UP FLOAT COLLAR

AUTOMATIC FILL-UP FLOAT SHOE

HALLIBURTON RECIPO WALL CLEANERS

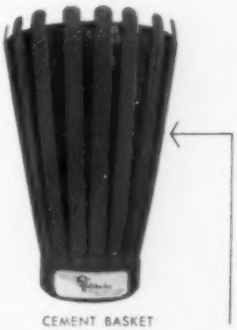
Newest concept of reciprocating type cleaner to remove undesirable filter and mud cake from bore hole giving better bonding of cement to formation and casing. Wide fluid passage areas reduce circulating pressure and bridging action of filter cake cuttings with or without lost circulation materials ... thoroughly cleans wall of hole due to increased velocity. Minimizes bore hole or filter cake damage. Breaks up channeling action through drilling fluid. Greater area cleaned with wide and tough rubber fingers, plus easy and fast latching to casing with hinged design.



RECIPO WALL CLEANER

HALLIBURTON CEMENT BASKET

Basket acts as support after cement is pumped and "bridges" heavy cement columns until initial set. Protects weak formations and retains cement by reducing slurry loss and breakdowns of porous formations. Successful performance when run outside casing or liner above defective formations.



CEMENT BASKET

HALLIBURTON VISE-LOK LIMIT CLAMP

Superior lock-on power handles loads up to 20,000 lbs. This non-weld limiting device sets itself tighter to casing as more load is exerted against it. Greater protection from vertical movement is achieved by special file hard gripping disc slips inside hinged steel ring which are forced against casing by taper pins from behind. Hinged for easy installation, the Vise-Lok eliminates welding of lugs or limiting devices.

VISE-LOK LIMIT CLAMP

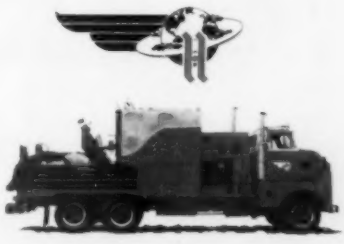
LATEX CEMENT

A low fluid loss cement for squeeze cementing or "tailing-in" on primary cementing. Perforating properties exceptional, with minimum shattering as compared to portland cement. Higher resistance to mud contamination, acid and corrosive fluids with added resiliency and bonding qualities to cement.

HALLIBURTON

CEMENTING SERVICES

HALLIBURTON OIL WELL CEMENTING COMPANY • DUNCAN, OKLAHOMA



"WORLD-WIDE LEADER IN OIL WELL CEMENTING—RESEARCH AND APPLICATION"

SAVE money

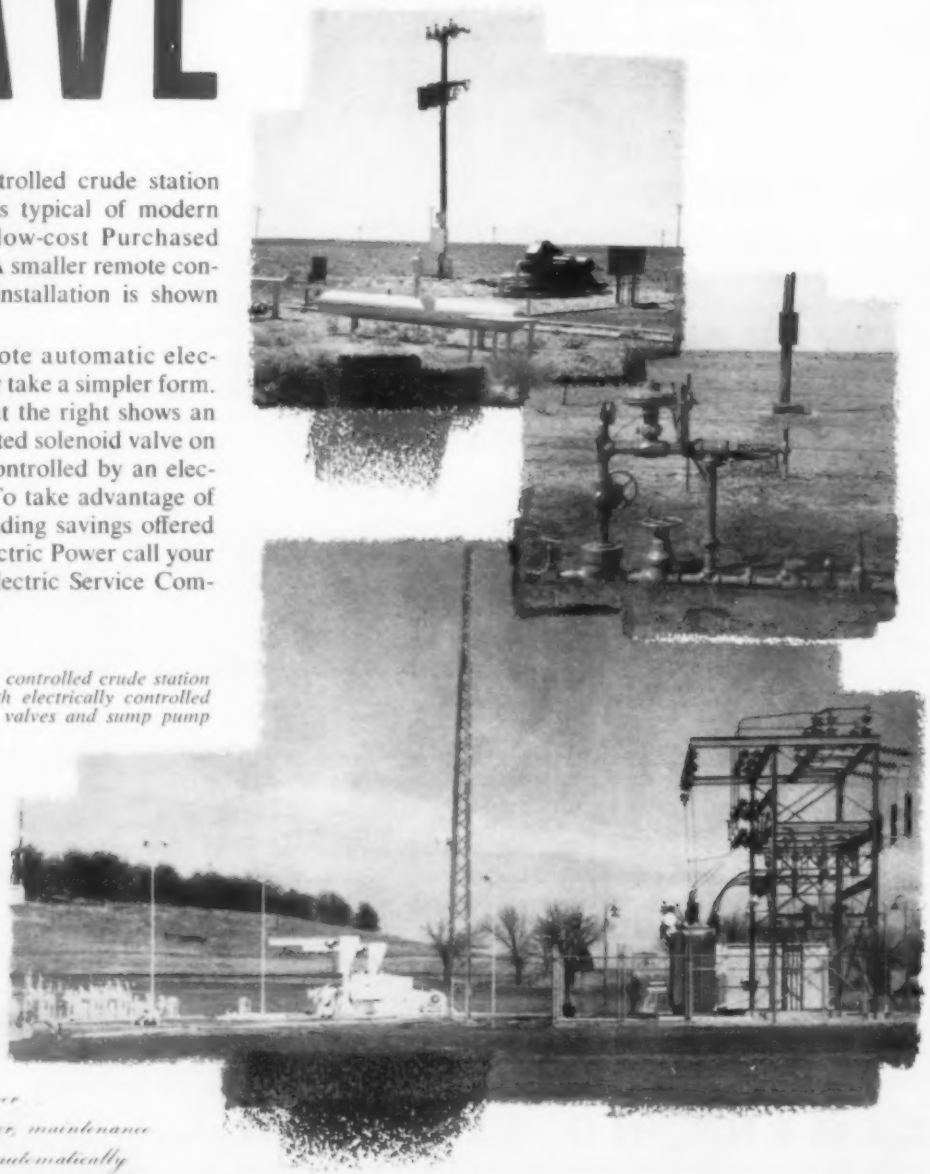
SAVE maintenance

SAVE manpower

SAVE with Remote Control

The remote controlled crude station pictured below is typical of modern application of low-cost Purchased Electric Power. A smaller remote controlled pipeline installation is shown at the top.

However, remote automatic electrical control may take a simpler form. The illustration at the right shows an electrically operated solenoid valve on a flowing well, controlled by an electric time clock. To take advantage of the many outstanding savings offered by Purchased Electric Power call your nearest Utility Electric Service Company or write us.



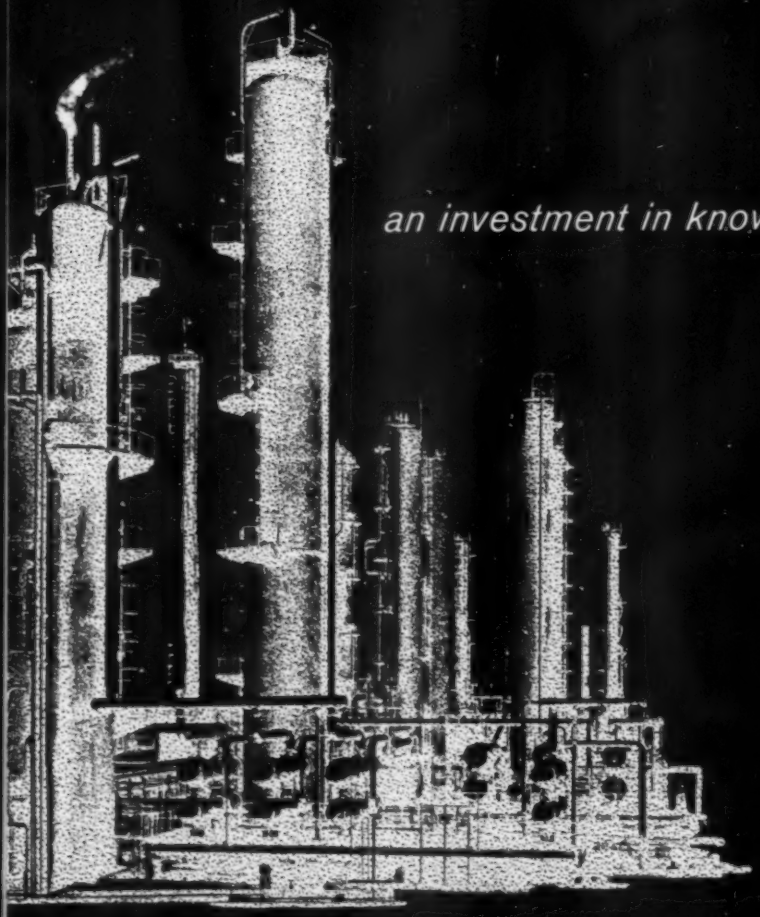
Remote controlled crude station with electrically controlled valves and sump pump

1928 – 1958 30 PEPA

Purchased Electric Power saves money, manpower, maintenance and serves you better automatically

Petroleum Electric Power Association

P.O. BOX 35006, DALLAS 35, TEXAS



*an investment in knowledge pays the best interest **

* BENJAMIN FRANKLIN

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CONSTRUCTORS

A Division of Tellepsen Construction Company

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Indicating Motion-Balance Transmitters
...for flow, pressure, and level

Low Displacement Force-Balance Transmitters
...for flow, pressure, and level

Thermocouple and Resistance Bulb Converters
...magnetic amplifiers...no vibrators
...no mechanical rebalancing

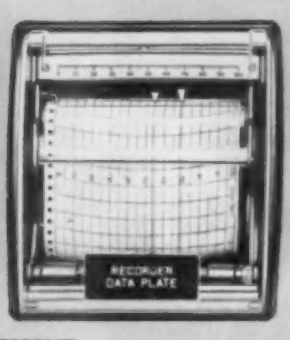
Displacer Level Transmitters
...force-balance for simplicity

Control Valves
...electro-pneumatic and electro-hydraulic actuators

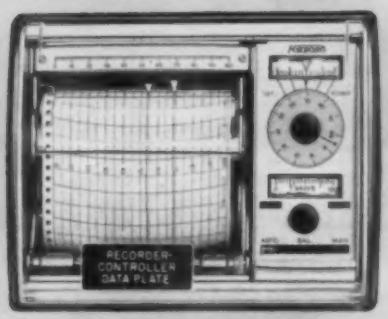
CONTROLLER
The Electronic Consotrol Controller (shown 4/5 actual size) concentrates all control and supervisory functions in one slim 3 x 6 inch case. Controller operation is entirely independent of recorder.

FOXBORO Electronic

REG. U.S. PAT. OFF.



RECORDER
Electronic Consotrol Recorders (shown ¼ actual size) use a simple, powerful pen motor which can be operated directly from transmitter signal without amplification. Available in 1 and 2 pen models.



COMBINED RECORDER-CONTROLLER
Electronic Consotrol housing design permits unequalled flexibility in panel arrangement. Recorders and controllers can be mounted separately in individual housings—or enclosed in a compound unit. Regardless of mounting, either unit pulls out independently.

for the first time... the 100% solid state electronic system!

- thermocouple and resistance bulb converters – using magnetic amplifiers
- choice of force-balance and motion-balance transmitters
- long time-constant tubeless controllers

Consotrol Instrumentation

Electronic Consotrol* Instrumentation—the most complete and advanced family of electronic-operated measurement and control instruments available today! That just begins to describe Foxboro's dramatic new advance in instrumentation. ✓ ✓ ✓ Foxboro electronic transmitters, indicators, recorders, control stations, computing stations, valve actuators and other final operators cover every function in the control loop. All are linked by a d.c. current signal. All are completely tubeless. Even thermocouple and resistance-type systems no longer require vacuum tubes. ✓ ✓ ✓ Electronic Consotrol systems convert temperature, pressure, flow, level measurement, etc., to a proportional signal **at the transmitter.** Transmission to a remote control station is instantaneous—using an electronic motion-balance or force-balance transmitter. Designs are available for both hazardous and non-hazardous areas. ✓ ✓ ✓ Electronic Consotrol Instrumentation heralds a whole new era in process control engineering. Write Foxboro today for the new 32-page Catalog 21-10 which gives full details. The Foxboro Company, 6011 Neponset Ave., Foxboro, Mass., U.S.A.

*Reg. U.S. Pat. Off.

Unique Teamwork

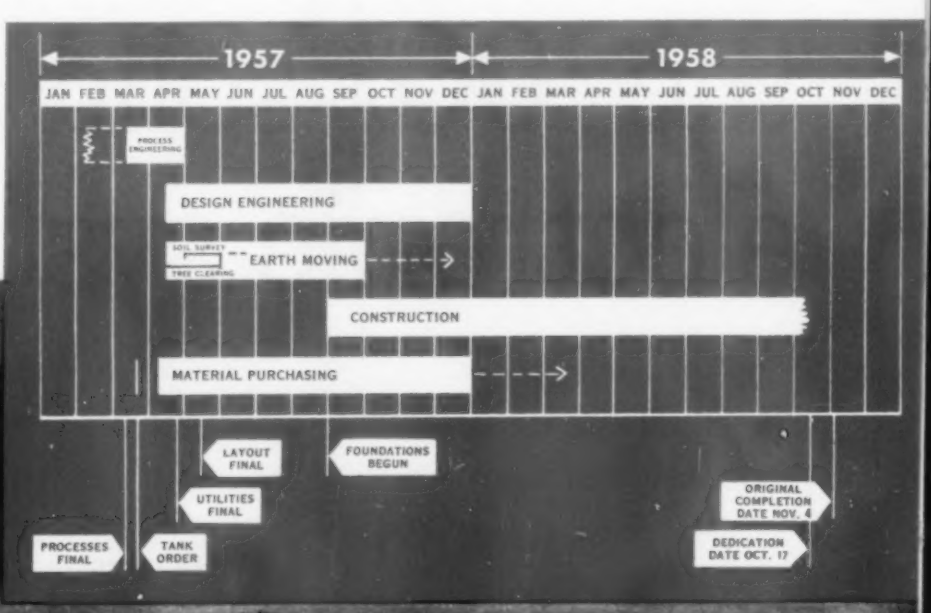
Speeds Completion of B/A's Port Moody Refinery

Foreseeing unusually rapid changes in the West Coast marketing situation, the British American Oil Company in the Spring of 1957 decided a new "grass roots" refinery was required in the Vancouver area by the Winter of 1958. Eighteen months or so is a short time to plan and execute a refinery project. Canadian Kellogg's accomplishment of this unusual speed record is a testimony to the B/A organization and its ability to delegate decision-making. Working with a special team of B/A engineers who could make decisions "on the site", Kellogg completed the project ahead of schedule.

One of the first things Canadian Kellogg required were horses—the only transportation the engineers could use to negotiate the muddy conditions on the site. But a strategically placed drainage and pumping system soon dried the ground and proved so effective that after its installation not one day's labor was lost through wet conditions. Other practical solutions to construction problems, plus the most advanced chemical engineering, have made the investment per barrel capacity of the B/A Port Moody refinery relatively very low.

Right from the start Canadian Kellogg's experience and B/A's cooperation pushed the job ahead of schedule. Of course, B/A and Canadian Kellogg have worked together before. The Port Moody contract was awarded to Canadian Kellogg mainly on past performance . . . this move in itself saved the time and money normally spent preparing and analyzing detail bids. Mutual respect between client and contractor was one of the outstanding factors that contributed to the speedy completion of the project.

Right: *Chart shows rapid construction progress made on the Port Moody project.* Below: *Air view of new B/A Port Moody refinery, Vancouver, British Columbia. Process section, right, is subdivided into five areas: (1) Crude Unit, (2) Catalytic Reformer and Distillate Desulfurization Unit, (3) Utility Plant, (4) Orthoflow® Fluid Cat Cracker, and (5) Alkylation Unit.*



KELLOGG

THE M. W. KELLOGG COMPANY, 711 THIRD AVENUE, NEW YORK 17, N. Y.

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PARKERSBURG QUALITY

Brinell hardness of pinion forging is determined by inspector, one of many controls that make Parkersburg units outstanding.

Diameter of main gear is checked with bow mikes in the Parkersburg plant. Parkersburg quality begins in the plant.

that begins on the production line

Parkersburg Pumping Units are better because they are *built* better. From drawing board to installation in the field, quality control assures you of better performance and greater economy when you specify Parkersburg. Parkersburg Pumping Units do the job right because they are *built* right. In any field, Parkersburg Pumping Units are outstanding. They are always your best buy.

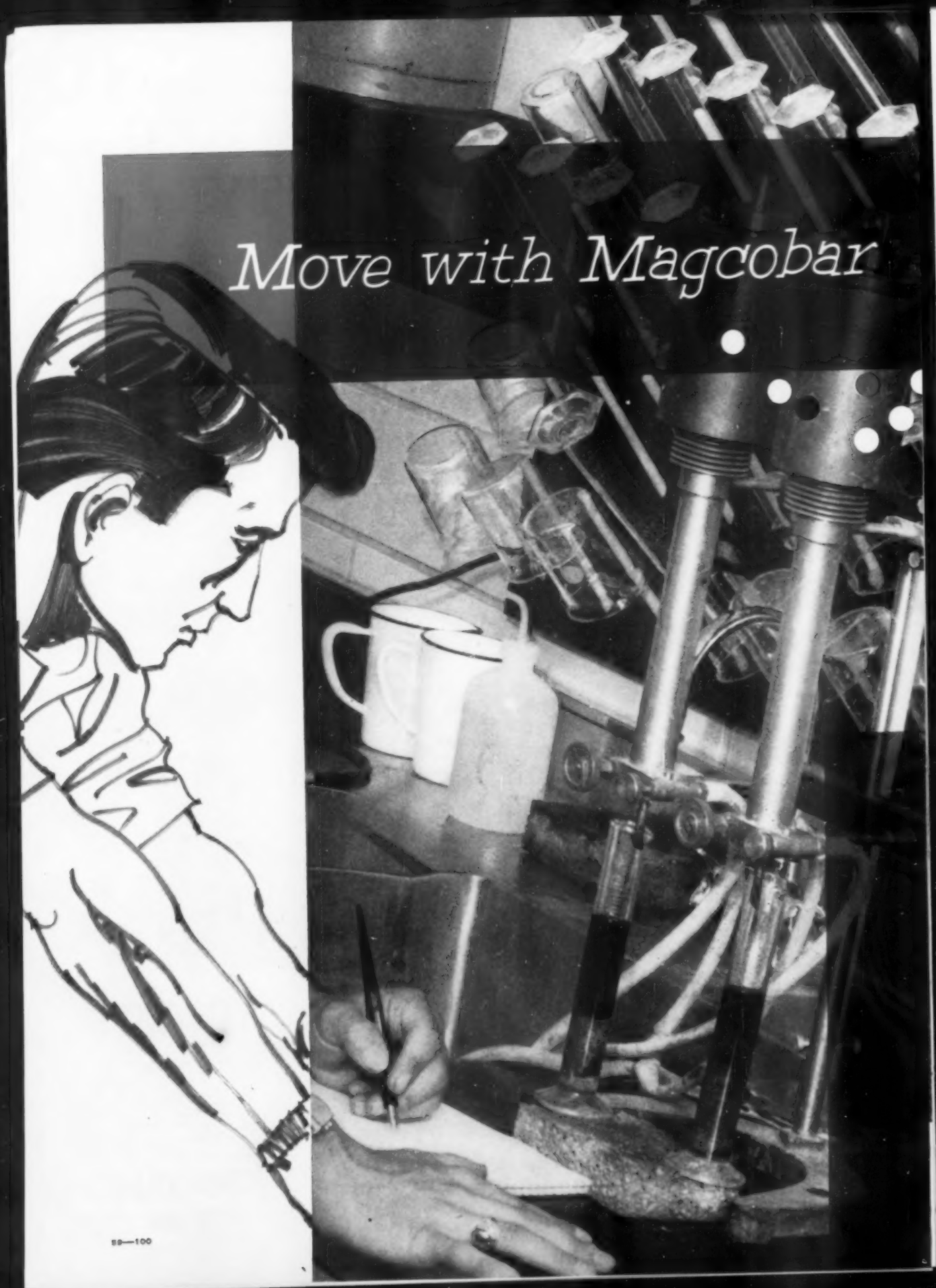
GIVES YOU PUMPING ECONOMY IN THE FIELD

THE PARKERSBURG RIG & REEL COMPANY
Division of Parkersburg-Aetna Corp.

THE PARKERSBURG RIG AND REEL CO.

Pumping Unit Division Offices:
710 Mid-Continent Building, Tulsa, Okla.

Parkersburg Pumping Units are available through the following supply stores: Beacon Supply Co., Bovaird Supply Co., Canadian Equipment Sales & Service Co., Ltd., C. W. Cotton Supply Co., Franklin Supply Co., Franklin Supply Co., Ltd., Houston Oil Field Material Co., Inc., Industrial Supply Co., Iverson Supply Co., Midland Supply Co., Inc., Mountain Iron & Supply Co., Murray-Brooks, Inc., Oil Equipment, Ltd., Producers Supply & Tool Co., Rodman Supply Co., Superior Iron Works & Supply Co., United Supply & Manufacturing Co., Wilson Supply Co.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to Better Drilling

FOR COST-CUTTING PRODUCTS

THE KNOW-HOW TO USE THEM

There are three sound reasons why Magcobar can cut your drilling costs. First, proved excellence of products. Second, the industry's best trained mud engineers plan the mud program for your well and keep it running smoothly. Third, extensive research facilities keep bringing you the best drilling chemicals and additives for your particular problems.

Bringing these three important reasons for Magcobar superiority to their present high level can never be the work of a day or a year by any company. Product quality is based only on careful controls and strict analyses from production to well. A mud engineer's skill is born with training in the lab—a big lab with experience—matures under a wide range of field conditions, and reaches full power in the continual mastery of new techniques, new products. And research, a word frequently sinned against, means continuing expense, continuing outlay of cash to keep on providing the drilling industry with the best products and techniques.

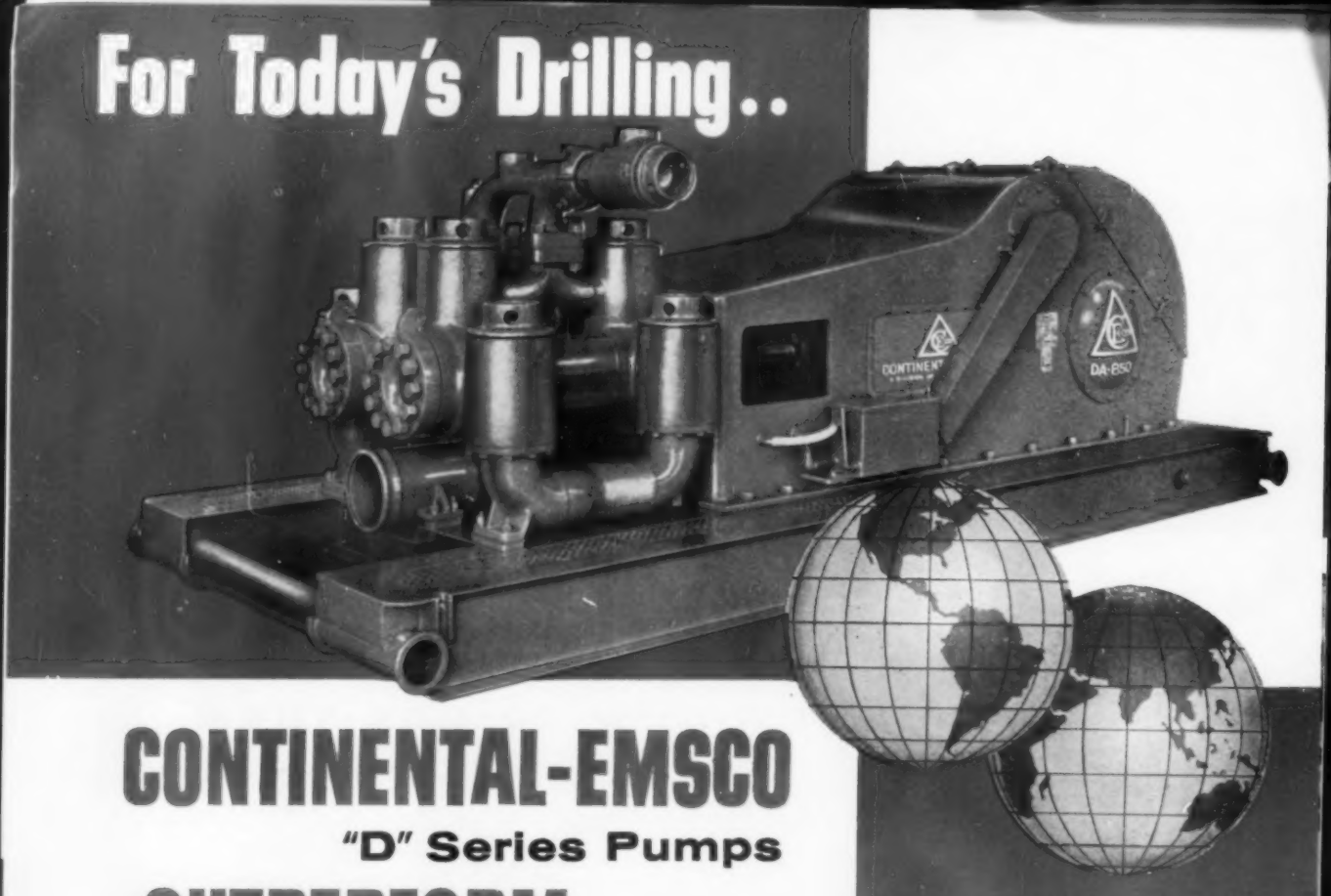
Save with Magcobar on your next well.

MAGNET COVE BARIUM CORPORATION

HOUSTON

Magcobar
Complete
DRILLING MUD SERVICE

For Today's Drilling..



CONTINENTAL-EMSCO

"D" Series Pumps

OUTPERFORM them all

Continental-Emsco "D" Series Pumps have proven themselves on drilling locations the world over.. proven they are heavy enough to handle the volumes and pressures demanded by modern drilling.. yet light enough to save you money in transportation costs and rig-up time.

This *proven* combination of weight and performance comes from weight reducing Fabriform construction and a rugged herringbone gear train that provides smooth, steady power. With Fabriform, steel plates and shapes are used in place of heavy, bulky single castings.. giving you low weight with improved performance. Simplified maintenance is another time-saving feature of the "D" Series Pumps. There are no power end adjustments to make .. no greasing to do.. lubrication is completely automatic.

More *proven* advantages are yours with Continental-Emsco Slush Pumps.. get all the facts about big performance.. low weight "D" Series Pumps.

SIX SIZES – D-175, D-300, DA-500, D-700, DA-850, D-1000

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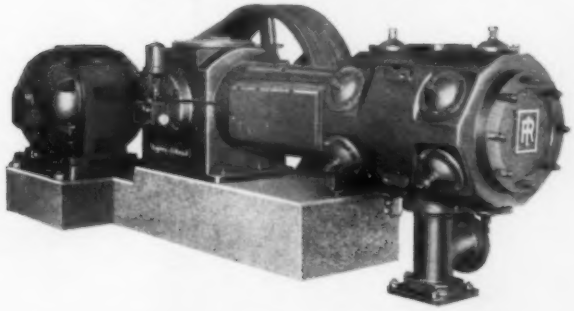
CONTINENTAL-EMSCO COMPANY

SP 804

NEW COMPRESSORS

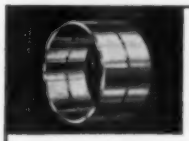
...with heavy-duty features proven in larger Ingersoll-Rand compressors

ESH* (horizontal)



ESV* (vertical)

*The same compressor in either horizontal or vertical arrangement – 20 to 150 hp sizes, single-and multi-stage, pressures up to 5000 psi and vacuums.



Full-floating aluminum bearings never need adjustment

The full-floating bearings "roll with the punch," taking each thrust on a different portion of the shell. They are foolproof, and never require fitting or adjustment. Main and crankpin bearings are made of I-R's special aluminum bearing alloy, which has higher load capacity and better heat conductivity than other bearing materials.

Air-cushioned Channel Valves give unmatched performance

Known the world over for lasting efficiency, dependability and quiet operation, Ingersoll-Rand air-cushioned Type A Channel Valves are entirely different in design and principle from any other valves in use. Type A Channel Valves were developed especially for modern compressor speeds, and feature a separate stainless-steel seat plate which can be reversed or replaced for new life.

Never a need for adjustments– frame is kept sealed!

Here's an entirely new line of compressors, built to run longer — much longer. They're more compact, more efficient, and require less attendance, less maintenance. They offer greater capacity in less space, and are ruggedly built and highly refined to take years of continuous hard service.

All running parts are precision-machined and need no fitting or adjusting, so the frame is sealed — dirt stays out, and the major causes of wear are eliminated!

There are many design features—including filtered force-feed lubrication and full-floating self-adjusting metallic packing — that have heretofore been found only in larger Ingersoll-Rand compressors. Let your I-R representative tell you more about these new compressors, and how they can save you money.

Ingersoll-Rand

I-815 11 Broadway, New York 4, N. Y.

In engineered products, there's no substitute for experience!

COMPRESSORS • GAS & DIESEL ENGINES • PUMPS • AIR & ELECTRIC TOOLS • CONDENSERS • VACUUM EQUIPMENT • ROCK DRILLS

Weather 35° below zero does not impede the efficiency of these six AAF Type W Cycoils at Taylor, B. C. They provide clean air for the six 2000-hp compressors at Westcoast Transmission Co. Ltd.'s Compressor Station #1.

COLD ... but CLEAN ... CYCOIL air helps power Canada's Big Inch

Westcoast Transmission Co., Ltd.'s Compressor Station #1—initiating station of Canada's new seven-station, 17-compressor, 52,500-hp Big Inch Line—is the northernmost complex of its kind in the western hemisphere. Here British Columbia "sour" gas is "sweetened", compressed, and started on its journey toward the U. S. border, more than 750 miles away.

Despite bitter cold, AAF Type W Cycoil oil-bath intake air filters efficiently and uninterruptedly provide clean air for the safe operation of six 2000-hp gas engines. The only concession to the cold—which sometimes reaches 50 below zero—is the use of Arctic-type oil!

Whether your operation is in the frozen north, a temperate region, or a hot and dusty desert . . . whether the application is pulsating action or smooth flow, packaged or stationary units, automatic station or not . . . AAF has filters *engineered* to match your requirements. For complete information, call your nearest AAF representative; or, write direct for Bulletin 130.

Type CMS Multi-Duty Filters

Type G Pipeline Air Filters

AAF — American Air Filter COMPANY, INC.

BETTER AIR IS OUR BUSINESS

444 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

Type OCH Intake Air Filters

Cycoil Oil Bath Air Filters

There is a difference in sucker rods

For medium to heavy pumping loads in non-corrosive fields. Offers quality and service unexcelled.

A very high grade carbon manganese steel made to Jones specifications, fully normalized, descaled and shot peened to add strength and endurance.

Specify Jones Sucker Rods for proved longer life.

FOUR TYPES OF JONES SUCKER RODS FROM WHICH TO CHOOSE

Type	Identification	USE	DESCRIPTION	PHYSICAL PROPERTIES					
				Yield 1000 psi	Ultimate 1000 psi	% Elong. in 8"	% Red. of Area	Izod	Brinell Hardness
J-12	Protector ends painted BLUE	For heavy pumping loads under all conditions	Made from processed electric furnace steel with high yield strength and excellent fatigue resistance.	95-105	110-125	12-17	65-75	90-110	229-260
J-8	Protector ends painted BLACK	For extremely heavy pumping loads	A special alloy steel of exceptional yield strength and well-balanced physical properties.	100-115	120-135	10-15	50-60	65-85	240-260
J-7	Protector ends painted ORANGE	For medium to heavy pumping loads under all conditions	Called "standard of the industry". Strong, corrosion resistant nickle molybdenum steel, fully normalized, tempered, descaled and shot peened for further fatigue and corrosion resistance.	65-80	85-100	14-22	60-70	90-107	170-210
J-2	Protector ends painted WHITE	For medium to heavy pumping loads in non-corrosive fluids	High grade carbon manganese steel, fully normalized, descaled and shot peened to add strength and endurance.	60-75	90-105	18-24	60-70	60-90	160-210

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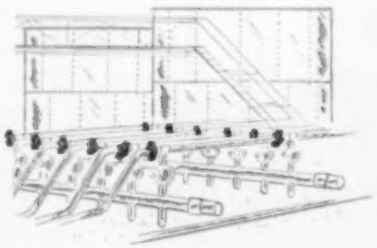

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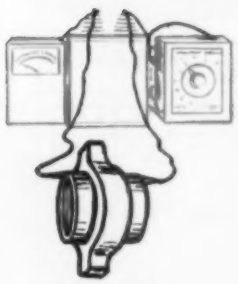

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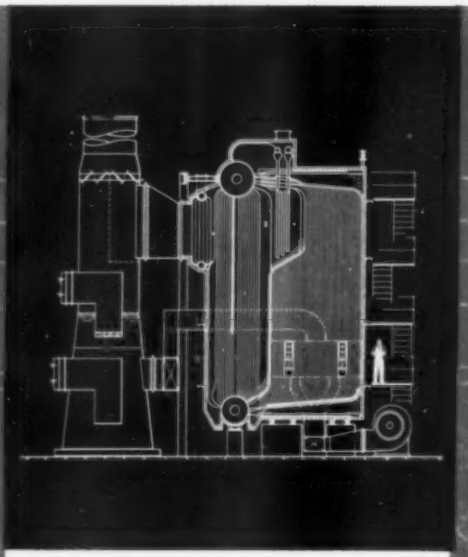
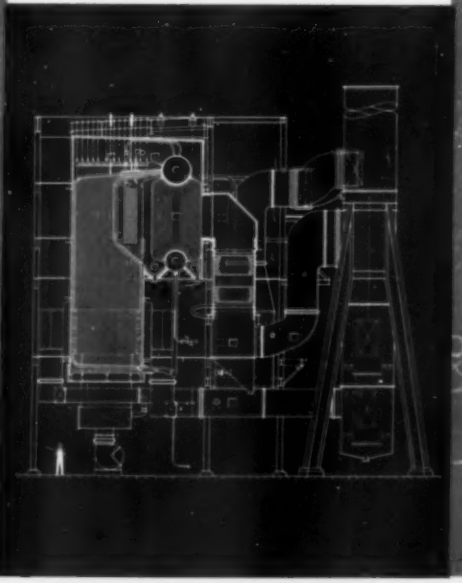


C-E VU-50B CO Boiler (above)—offers same construction and design as C-E's standard VU types. Features tangent waterwalls—welded skin casing—tangential firing—minimum number of baffles—economic advantages of bottom supports. Proven in hundreds of installations, this VU design gives high standards of performance with economy of operation, reliability, and minimal maintenance. This design is especially suitable where the quantities of CO gas burned are relatively small.

The design on this page represents a plan section diagram showing arrangement of C-E Tangential Burners for firing a completely water-cooled furnace.

C-E VU-40 CO Boiler (below)—this is a top-supported CO boiler installed at a Gulf Coast refinery. The plant cycle for this unit combines a catalyst regenerator, two gas turbine-driven compressors, two CO boilers, and separate turbine exhaust gas feedwater heaters located between the boilers.



Now tangentially fired C-E boilers for any quantity of catalyst regenerator gas for any quantity of steam required

which assure

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- minimum exposed refractory

C-E now has an expanded line of CO boilers that offer refineries the opportunity to profitably use the energy potential of even small quantities of catalyst regenerator gas. This makes available to refiners a wide range of C-E CO boiler sizes, all offering *big boiler* features. *All* incorporate the advantages of Combustion's service-proved VU-40, a top-supported design, or the smaller, more economical bottom-supported VU-50B boilers – and all are tangentially fired.

Tangential firing assures efficient combustion of CO gas with a minimal use of supplemental fuel... not only at high loads, *but also at low load.* Tangential burners assure the turbulence and complete mixing essential to efficient burning when the CO fuel mixture is injected into the furnace from minimum to maximum load.

Combustion's widespread experience has encompassed all types of steam generating equipment, including many installations firing lean fuels. If you have need of a boiler to burn catalyst regenerator gas, it's C-E for CO.

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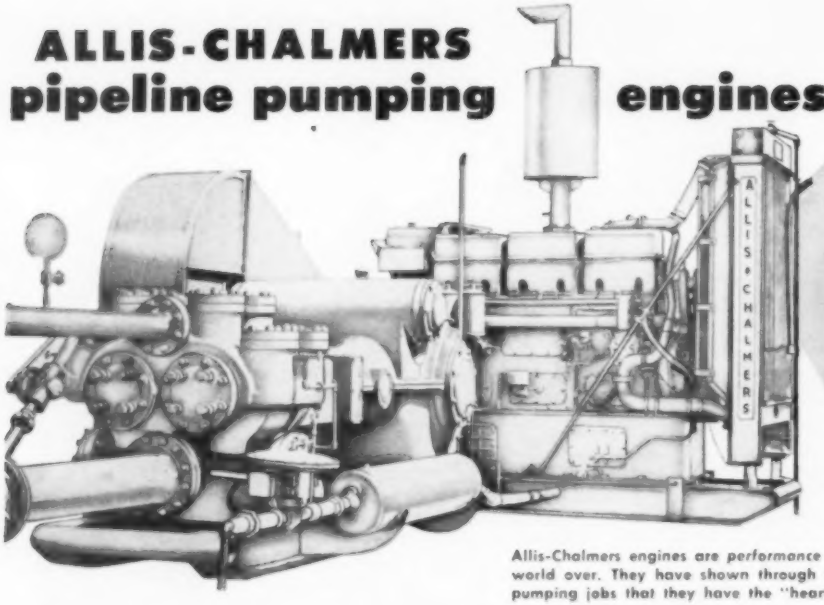

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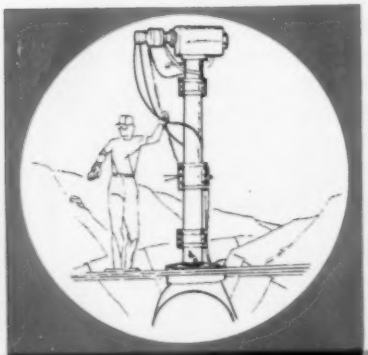

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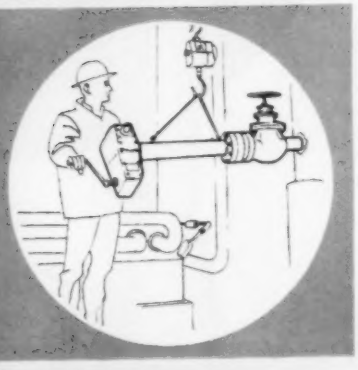

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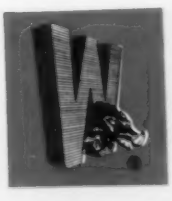

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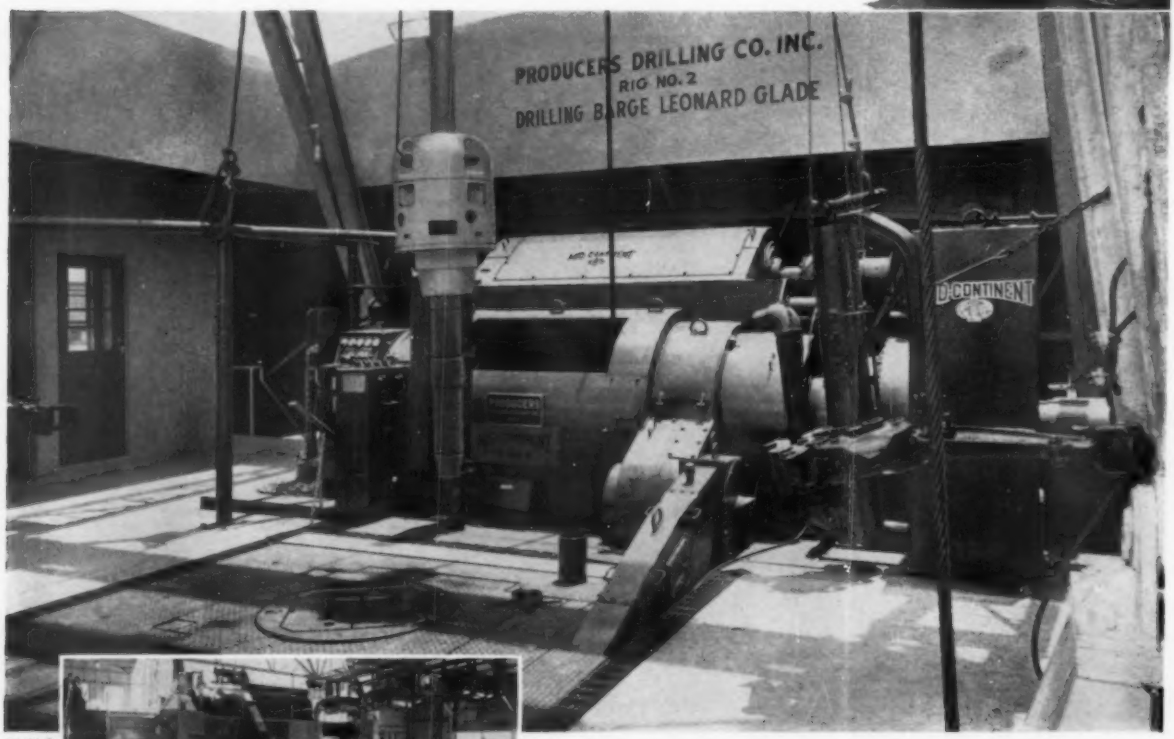
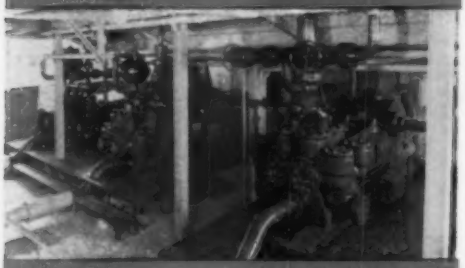


DW4-8

Mid-Continent S-612-A Swinging Compound* on the *Leonard Glade*.



Main slush pumps on the *Leonard Glade* are an Emsco D-1000 and D-700.

Producers Drilling Co., Inc. of New Orleans has selected Mid-Continent's 1400 horsepower U-914 drawworks for their recently-completed drilling barge *Leonard Glade*. This is the second barge-mounted rig completely equipped by Mid-Continent for Producers. The first barge, the *W. F. Youngblood*, was launched in 1957.

Major items of drilling equipment provided by Mid-Continent for the *Leonard Glade* include the drawworks, a Mid-Continent S-27½-A rotary table, a Mid-Continent S-612-A Swinging Compound* rig drive, Emsco D-1000 and D-700 slush pumps, a 14" unitized mud-mixing pump, and a Lee C. Moore cantilever-type mast.

For information about any item of drilling equipment or machinery, contact your Mid-Continent representative.

* PATENTED

MID-CONTINENT SUPPLY CO.

MID-CONTINENT BUILDING • FORT WORTH, TEXAS
Export Division: 45 Rockefeller Plaza, New York 20, N. Y. Cable: MIDCUMPORT NYK

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

Equipped to drill a depth of 24,000 feet with all crown block sheaves on TIMKEN® bearings

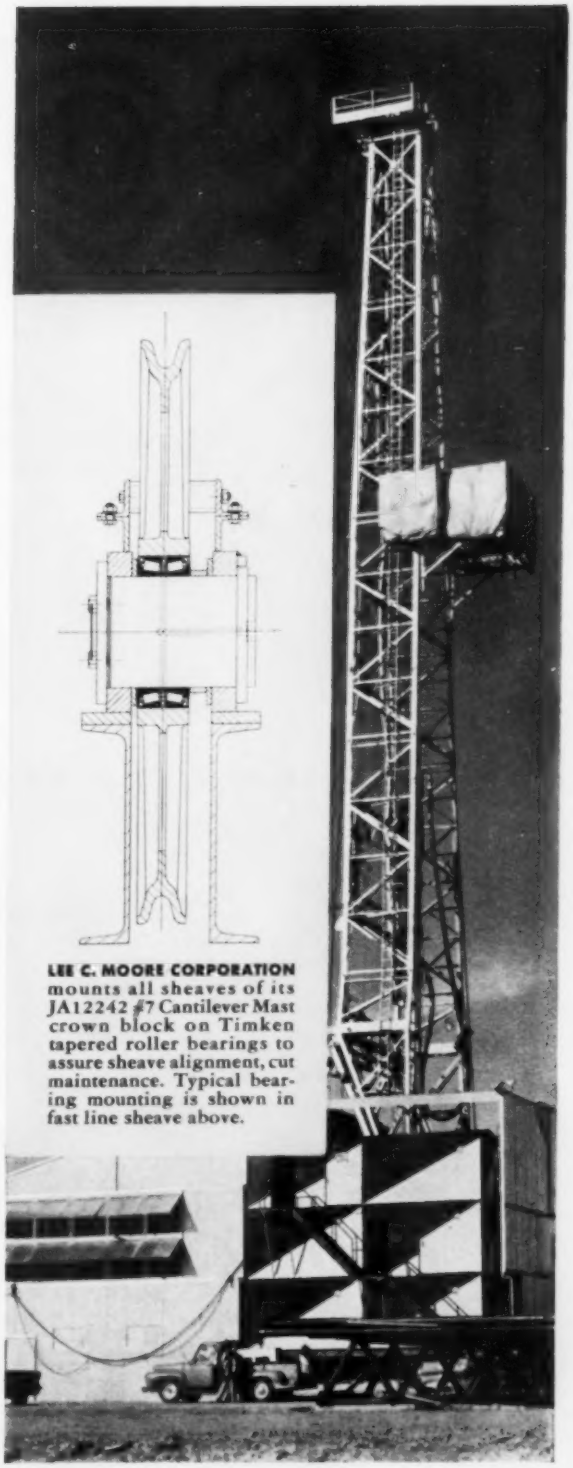
THIS rig in Oklahoma is equipped to drill a depth of 24,000 ft.! The mast is a Lee C. Moore 142′ Cantilever, with a gross capacity of 1,025,000 lbs. And for all crown block sheaves, Lee C. Moore used Timken® tapered roller bearings to keep sheaves properly aligned and turning easily, reduce maintenance.

The tapered construction of Timken bearings lets them take the heavy radial and thrust loads of deep drilling. And the full-line contact between rollers and races gives Timken bearings *extra* load-carrying capacity. Sheaves *stay* aligned and turn easier under constant, heavy loads. Drilling goes steadier.

Timken bearing rollers and races are case-carburized to produce hard, wear-resistant surfaces over tough, shock-resistant cores. They last longer, help parts work better, reduce maintenance. And Timken bearings are geometrically designed and precision-made to roll true. Friction is virtually eliminated. They *roll* the loads. We even make our own electric furnace fine alloy steel to be sure it's the finest. We're America's only bearing maker that takes this extra step to control quality.

Timken bearings make machines better. And better machines do better work, give you more for your money. That's Better-ness. Look for its symbol—the trademark "TIMKEN" on the bearings for the machines you build or buy. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



LEE C. MOORE CORPORATION mounts all sheaves of its JA12242 #7 Cantilever Mast crown block on Timken tapered roller bearings to assure sheave alignment, cut maintenance. Typical bearing mounting is shown in fast line sheave above.

BETTER-ness rolls on **TIMKEN®** tapered roller bearings

BRODIE performance and service prove why world-wide acceptance has grown through 3 decades

This partial list indicates countries to which Brodie Meters were shipped during one typical 3-month period:

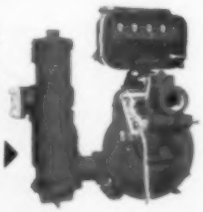
Angola	Greece	New Zealand
Argentina	Guam	Nicaragua
Australia	Guatemala	Norway
Belgian Congo	Haiti	Pakistan
Belgium	Honduras	Panama
Bahama Islands	Hong Kong	Persian Gulf Ports
Brazil	Iceland	Peru
British West Africa	India	Philippine Islands
British West Indies	Indonesia	Puerto Rico
Canada	Iran	Portugal
Chile	Iraq	Saudi Arabia
Colombia	Ireland	Somaliland
Christmas Island	Israel	Spain
Cuba	Italy	Sudan
Denmark	Jamaica	Sweden
Dominican Republic	Japan	Switzerland
Ecuador	Kenya	Tahiti
East Africa	Lebanon	Thailand
El Salvador	Liberia	Turkey
Finland	Malaya	Union of South Africa
Formosa	Mexico	United Kingdom
France	Morocco	Uruguay
French West Africa	Netherlands	Venezuela
Greenland		

BRODIE district offices and experienced representatives offer the most complete field and shop service in the petroleum metering industry – to every part of the nation and free world. This unmatched backing merely adds to the confidence *BiRotor* Meters have earned through sustained accuracy and low maintenance records. If you're buying meters – talk to your Brodie Metering Expert – as near as your phone.

811

Meters for pipelines, loading racks, custody transfer, tanker loading, blending and other stationary applications.

Tank truck, aircraft refueler, and other mobile metering applications.



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***BiRotor* METERS**

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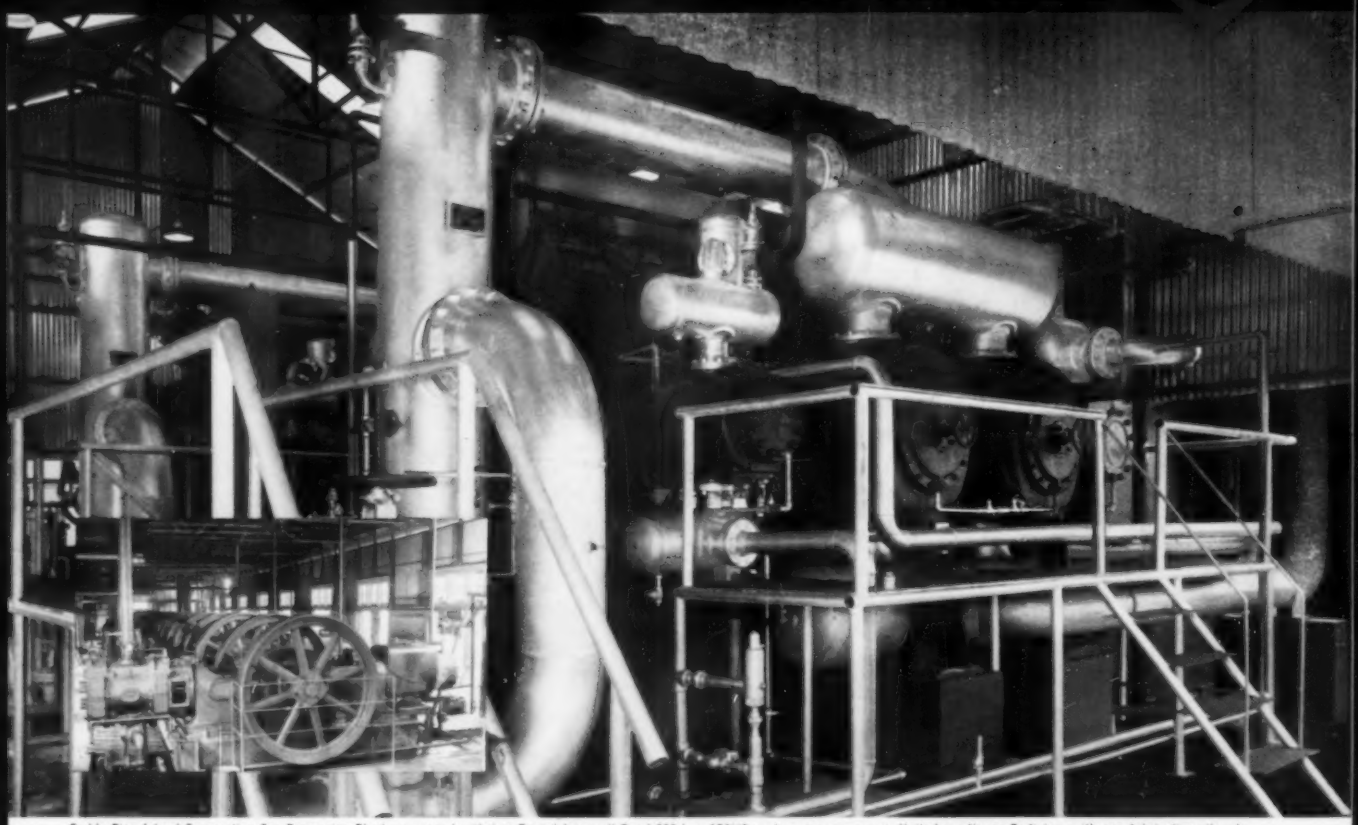
BEAIRD-INGERSOLL-RAND Packaged Compressor Plant

Lowest Cost Per Horsepower Installed



Caddo Pine Island Corporation Gas Processing Plant—equipped with two Beaird-Ingersoll-Rand 660 h.p. 12SVG packaged compressors. Units have Young Radiators with gas, lubricating oil and engine water cooling sections. Other sizes 120 to 660 h.p. Inset picture shows original horizontal compressors.

Two Packaged Compressors

DO WORK OF TWENTY OLDER UNITS

Caddo Pine Island Corporation processes flare gas from 1,000 Pine Island Field wells in an absorption plant located near Oil City, Louisiana. Picking its load up over a thirty mile gathering system, the plant was originally equipped with twenty horizontal compressor units. These have now been replaced by two Beaird-Ingersoll-Rand 12SVG 660 h. p. packaged compressors.

Using three stages of compression the packaged units pull the gas into the plant under ten inches of vacuum. It is then boosted through processing operations and returned for third stage boosting to the sales line. Up to 5¼ million cubic feet can be handled per day with final delivery pressures of 440 psi.

Installation of modern Beaird packaged compressors has increased plant dependability and lowered fuel, labor and maintenance costs. An additional savings will be realized when the field is depleted. Installation of packaged compressors has made the station almost wholly salvable.

Let Beaird engineers help you find an economical solution to your plant expansion or modernization program.

BEAIRD
another AMF product
PACKAGED COMPRESSOR PLANTS

Packaged Compressors are just one of the many products manufactured by Beaird for the petroleum and petrochemical industries. When you are in the market for new equipment or assistance in developing a specialized product . . . contact Beaird for a qualified appraisal or quotation.

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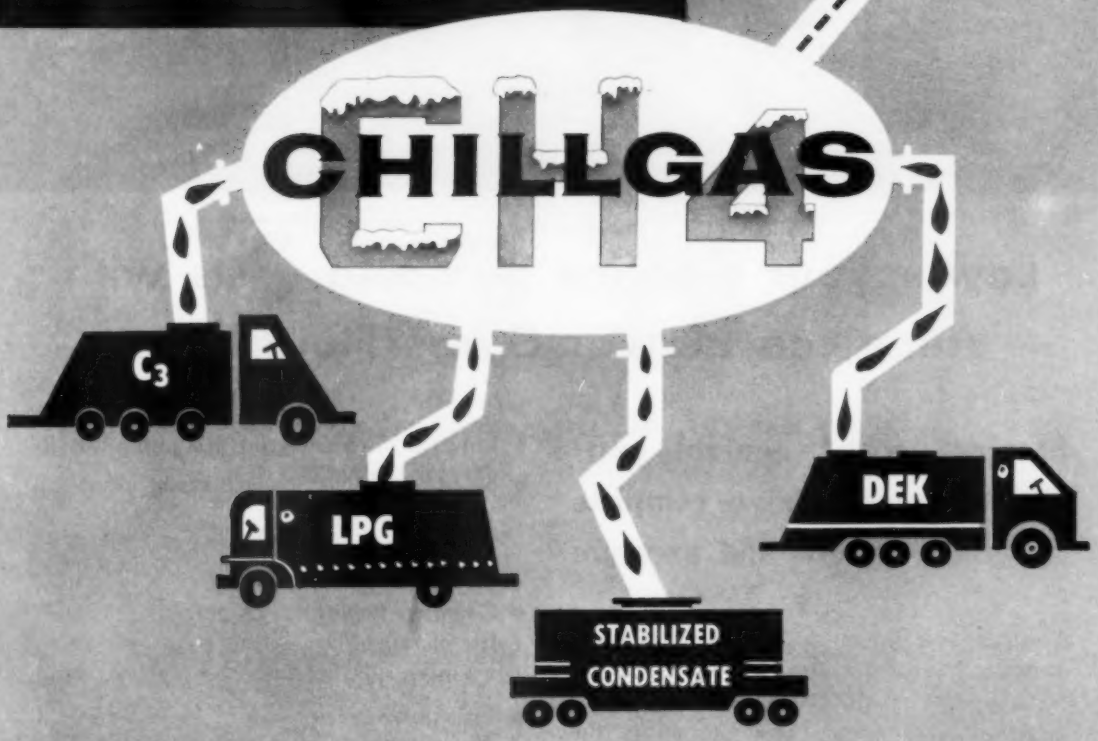

PERFORMANCE DATA:

High Liquid Recovery · Automatic Adjustment to Load Changes
Dehydrates With No Additives · Strips With No Pressure Drop

OPERATING DATA:
Capacities: 500 to 25,000 MCF/Day. Pressures: to 3000 psig. Recoveries: to 1000 bbls/Day.

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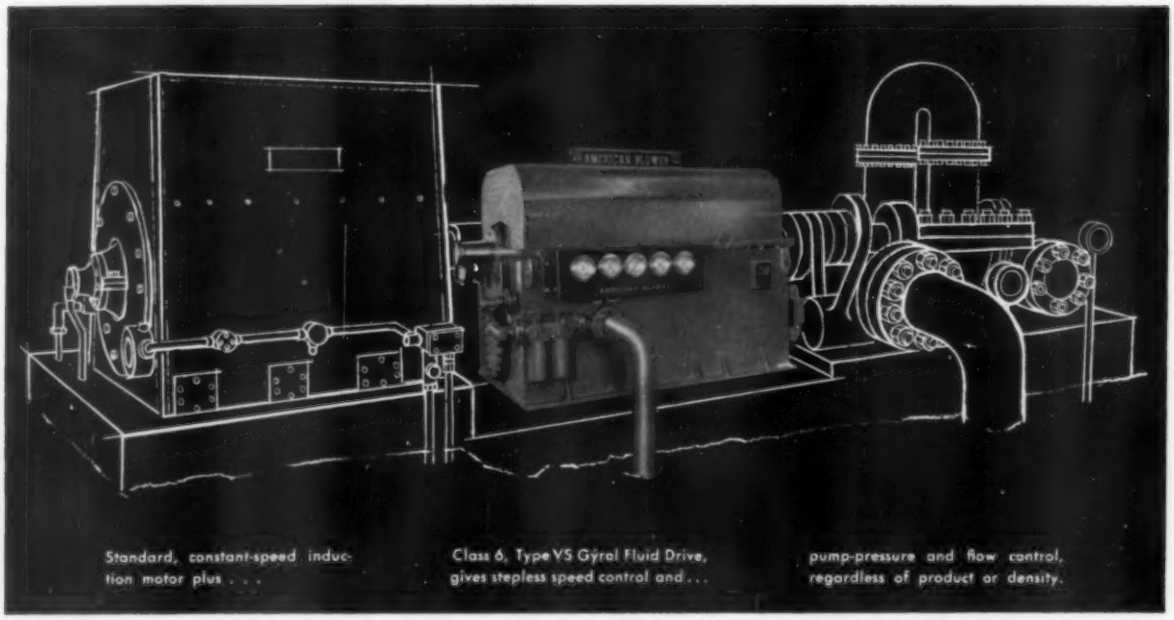
Standard, constant-speed induction motor plus . . .
Class 6, Type VS Gýrol Fluid Drive, gives stepless speed control and . . .
pump-pressure and flow control, regardless of product or density.

Lower your pipeline pumping costs with American Blower *Gýrol*® Fluid Drive

Stepless speed control ends throttling losses; gives complete flexibility of flow and pressure

Power savings up to 25% are possible when you equip centrifugal pumps with American Blower Gýrol Fluid Drive! Coupled with a standard, single-speed induction motor, the stepless, adjustable-speed Gýrol Fluid Drive controls flow and pressure without throttling; gives desired output at lowest power consumption.

Gýrol Fluid Drive also makes possible other major savings:

- Cost of throttling valve eliminated
- Equal flexibility with fewer units
- Lower maintenance cost; less pump wear
- No-load starting; lower demand charges

And Gýrol Fluid Drive brings important operating benefits:

- Complete flexibility—exact control, regardless of rate-of-flow required by changes in viscosity, specific gravity, seasonal demand
- Line protection—keeps line pressure within design limits
- Pump protection—holds minimum suction pressure

FOR FULL INFORMATION, contact one of our 73 branch offices; or write: American-Standard,* American Blower Division, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

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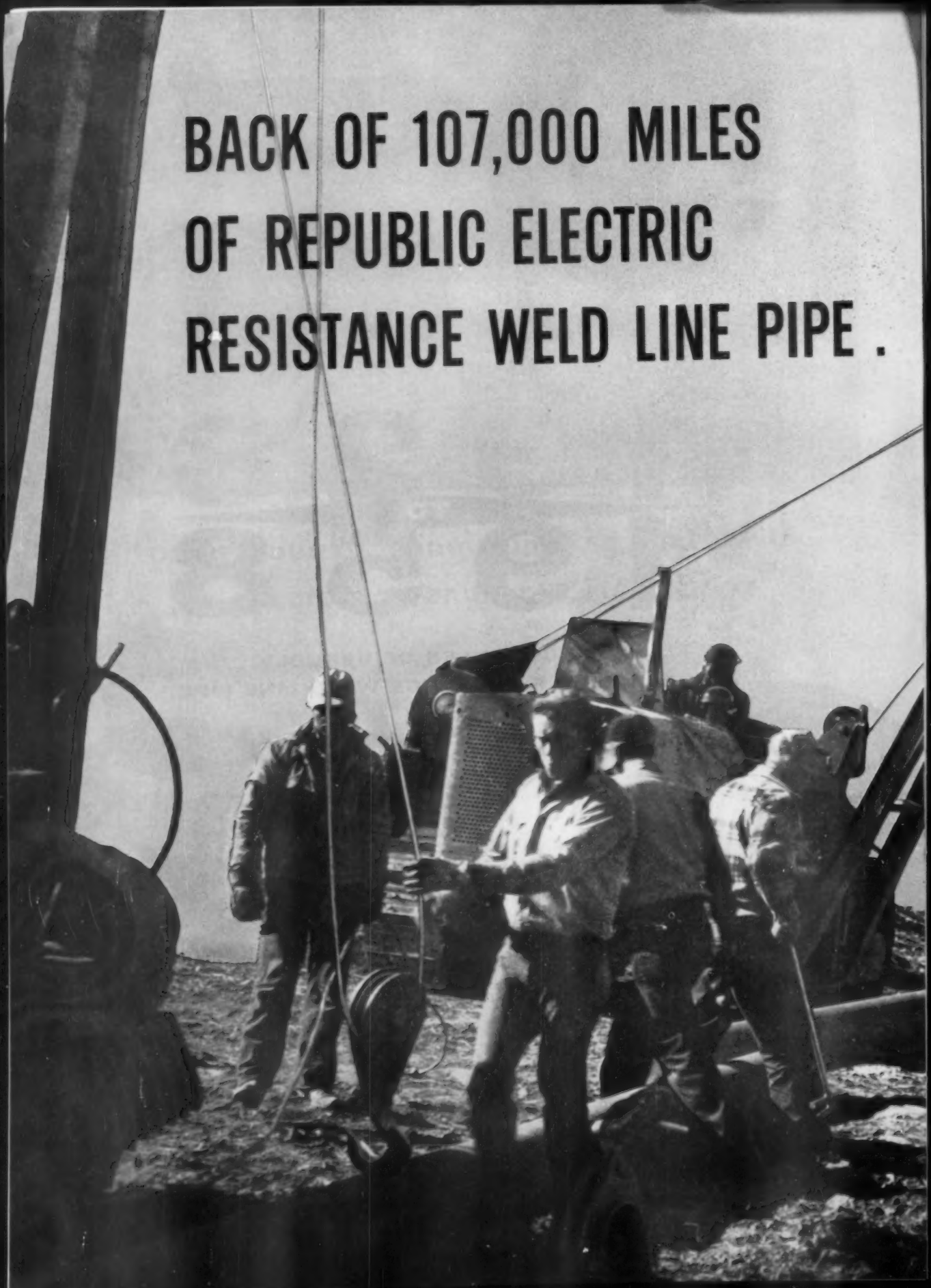
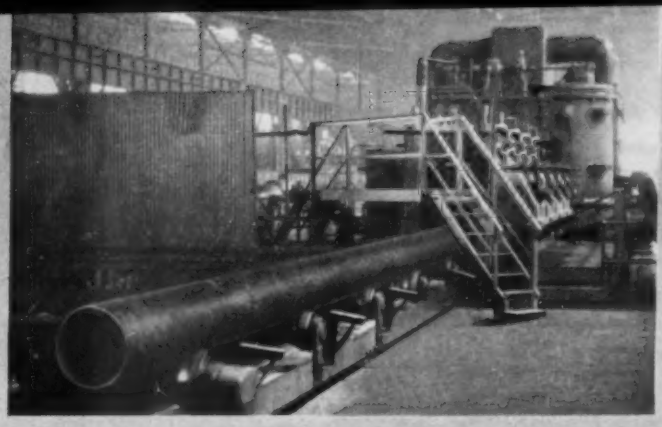
1928 TO 1958

107,000 MILES OF REPUBLIC
ELECTRIC RESISTANCE WELD LINE PIPE


BACK OF 107,000 MILES
OF REPUBLIC ELECTRIC
RESISTANCE WELD LINE PIPE.

Republic pioneered welded pipe making thirty years ago. The process starts with flat-rolled steel which is checked and tested before forming. Uniform wall thickness is assured right at the start, at the rolling mill. Thus, Republic Electric Weld Line Pipe is uniformly concentric, uniform in wall thickness. It is easy to line up for fast, sound, low-cost field welding. The cold-formed steel is extra ductile for smooth, uniform bends. And, uniform high-yield strength permits building high pressure lines.



more than 30 years of experience

The year was 1928. Calvin Coolidge had said, "I do not choose to run," and Hoover was campaigning. Ford was introducing the new "Model A". The Graf Zeppelin was circling the world, the first all-talkie was adding sound to the silver screen, and Republic Steel was pioneering a unique new method for producing highest quality line pipe.

Republic's revolutionary pipe-making process converted uniformly flat rolled steel into uniformly round cylinders. Edges were joined by electric resistance heat and pressure. The result: Republic Electric Weld Line Pipe for high pressure service — uniformly round, uniform in wall thickness, with the weld as strong as the wall.

Acceptance was immediate, and enthusiastic. Here was a pipe that went into the ditch fast, with minimum trouble. Easy to join. Smooth to bend. A real contribution to the growth of pipe line construction.

That was thirty years ago. Over the years, product refinements and improvements have been continuous. That's the experience you buy in every joint of Republic Electric Weld Line Pipe. Nobody knows more about making electric welded steel pipe than Republic — staffed with people who know the pipe line industry as well as they know steel.

REPUBLIC STEEL

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REPUBLIC STEEL

MORE REPUBLIC PIPE PRODUCTS FOR OIL AND GAS HANDLING....

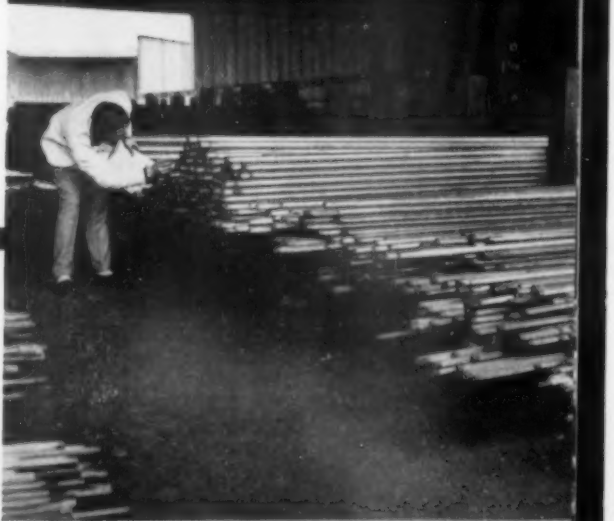
SRK PLASTIC PIPE for fluid handling applications where corrosion is a factor. Republic SRK is lightweight for low-cost shipping and easy handling. It is easy to cut, easy to join, makes a permanent installation fast—above or below ground. SRK (Semi-Rigid Kralastic) provides good impact resistance, is immune to damage from sunlight or electrolytic action. Republic also produces SRB (Semi-Rigid Butyrate) and FE (Flexible Polyethylene) plastic pipes, all available in a full range of sizes. Send coupon for facts.

HAVE YOU SEEN THE BRIGHT YELLOW PIPE? It is Republic's new X-TRU-COAT, combining the strength of steel with the corrosion resistance of polyethylene plastic. It's actually two pipes in one. Tough polyethylene in a sunlight-defying bright color is extruded over and permanently bonded to selected steel pipe or tubing. Ideal for all applications in which external corrosion may be a problem. Easy to install; can be bent and joined by conventional methods. Send coupon.

REPUBLIC CONTINUOUS BUTT WELD PIPE is stocked by local distributors for quick delivery any place, any time. Its uniform strength and ductility, tight galvanized coating, ease of threading, bending and welding, make it ideal for gathering and distribution lines and general maintenance work. Available in economical double-random lengths, in sizes ⅛″ through 4″ nominal. Mail coupon for more data.

SRK Plastic Pipe is quickly and easily joined.

X-TRU-COAT: plastic coating permanently bonded to steel pipe base.



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Vital to most petroleum operations is a guaranteed supply of water. Water for removing heat loads, process consumption and accompanying plant operations—all require determined amounts for an hour, a day, a year—indefinitely. That's why the well site must be accurately determined and the well constructed to deliver the available water.

Layne wells circle the globe. Every condition and every problem possible has been met and solved. This know-how and over three quarters of a century of experience result in efficient, economical wells—the basis of many industrial water systems. Layne drilled wells provide a reliable water source—the criterion for industrial water supply.

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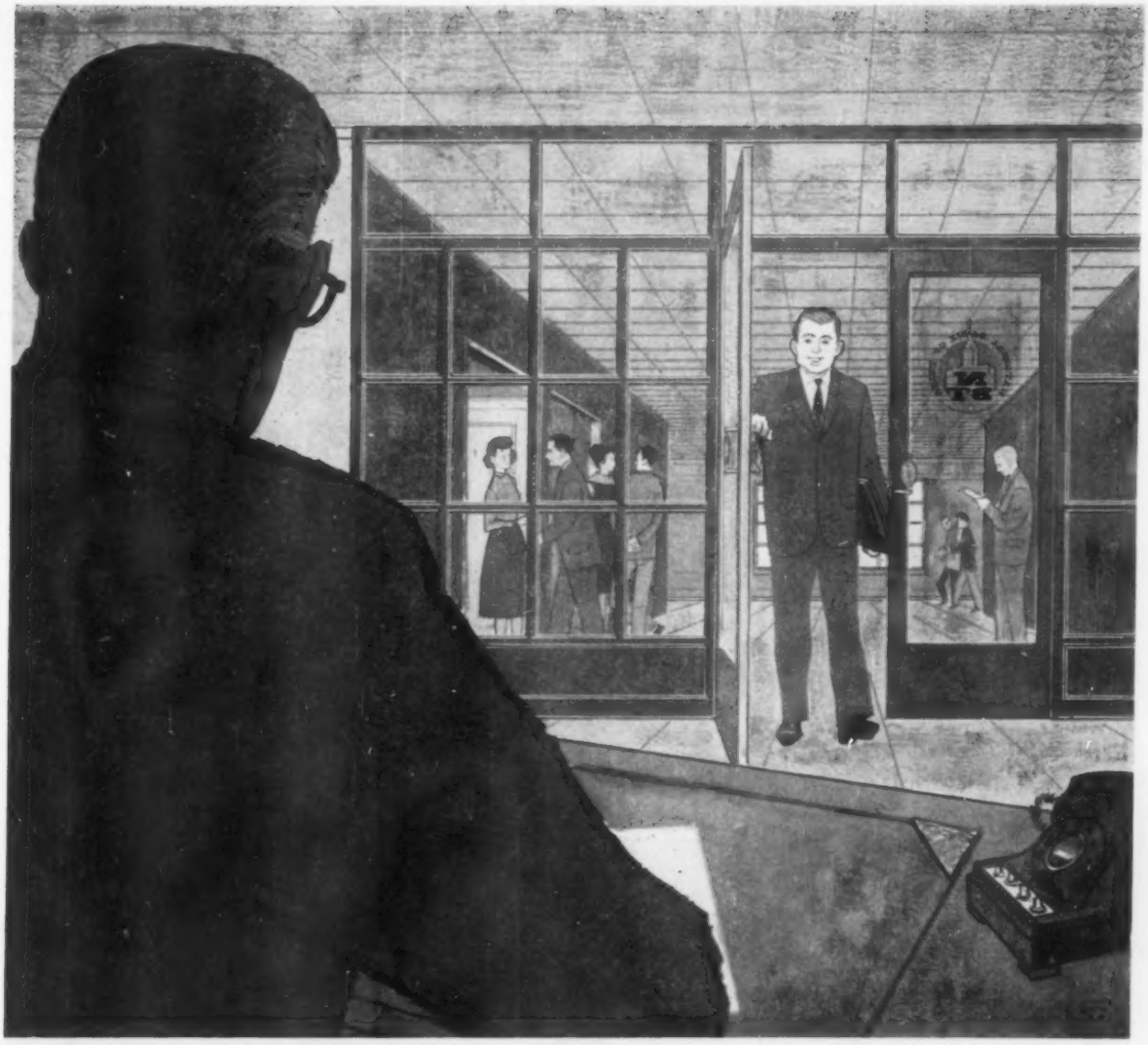

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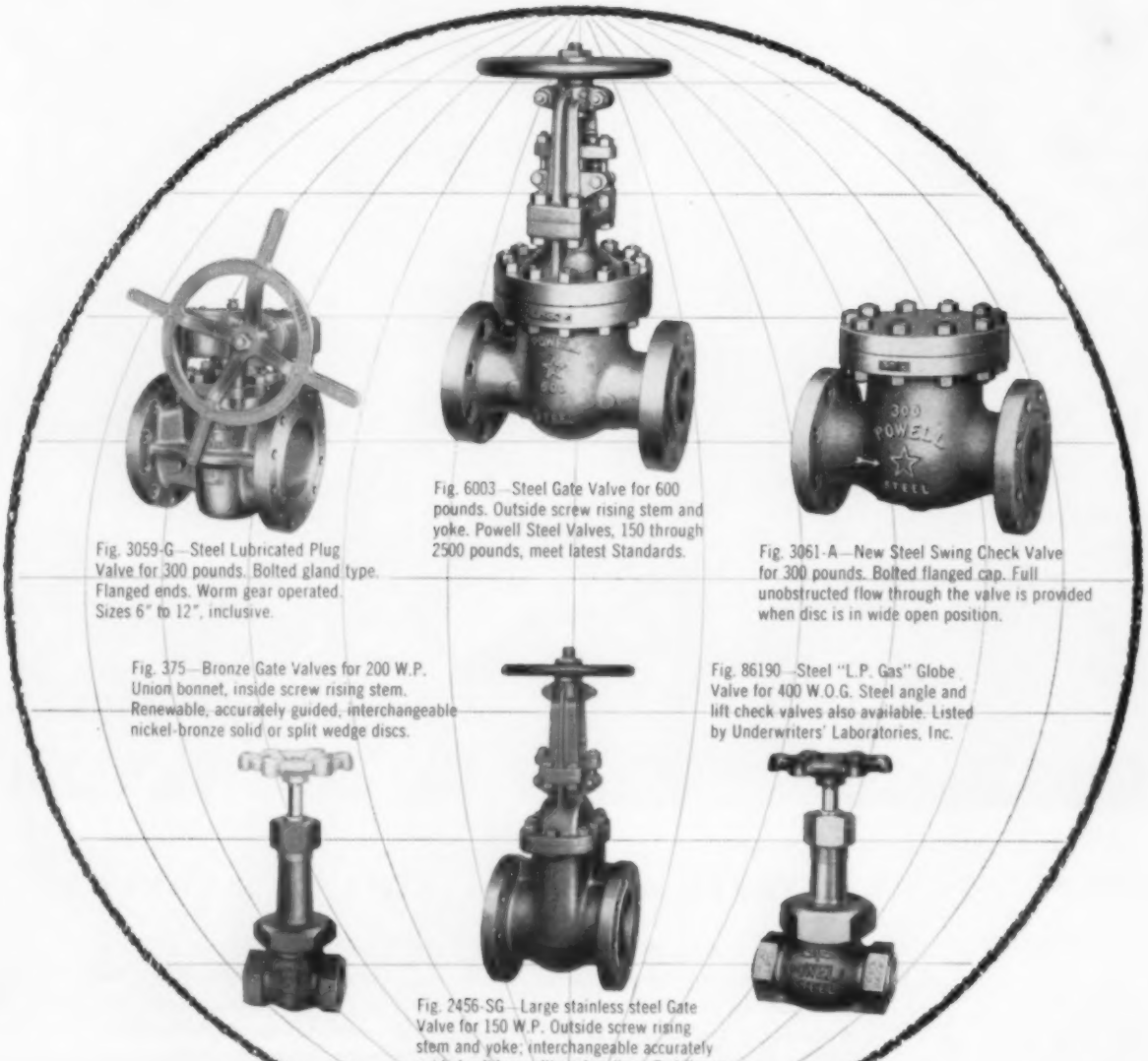

Fig. 3059-G—Steel Lubricated Plug Valve for 300 pounds. Bolted gland type. Flanged ends. Worm gear operated. Sizes 6" to 12", inclusive.

Fig. 6003—Steel Gate Valve for 600 pounds. Outside screw rising stem and yoke. Powell Steel Valves, 150 through 2500 pounds, meet latest Standards.

Fig. 3061-A—New Steel Swing Check Valve for 300 pounds. Bolted flanged cap. Full unobstructed flow through the valve is provided when disc is in wide open position.

Fig. 375—Bronze Gate Valves for 200 W.P. Union bonnet, inside screw rising stem. Renewable, accurately guided, interchangeable nickel-bronze solid or split wedge discs.

Fig. 86190—Steel "L.P. Gas" Globe Valve for 400 W.O.G. Steel angle and lift check valves also available. Listed by Underwriters' Laboratories, Inc.

Fig. 2456-SG—Large stainless steel Gate Valve for 150 W.P. Outside screw rising stem and yoke; interchangeable accurately guided solid or split wedge discs. End flange dimensions conform to latest standards.

A solution for every kind of flow control problem is as near as your local Powell distributor. Powell valves are designed and engineered in the largest variety of metals and alloys, to handle any medium, every flow control requirement. There are Powell distributors in all principal cities. Or, if yours is a special engineering problem, write to:

THE WM. POWELL COMPANY • *Dependable Valves Since 1846* • **Cincinnati 22, Ohio**

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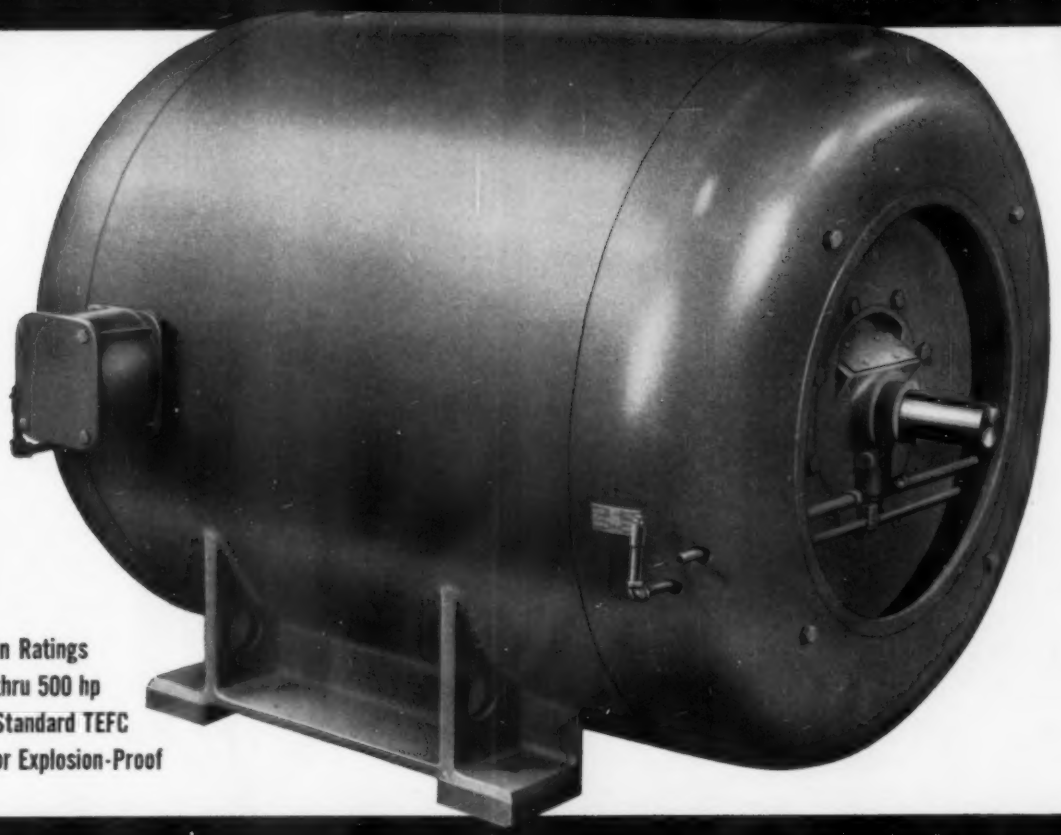


In Ratings thru 500 hp Standard TEFC or Explosion-Proof

WAGNER Tube Ventilated Motors can solve your problem

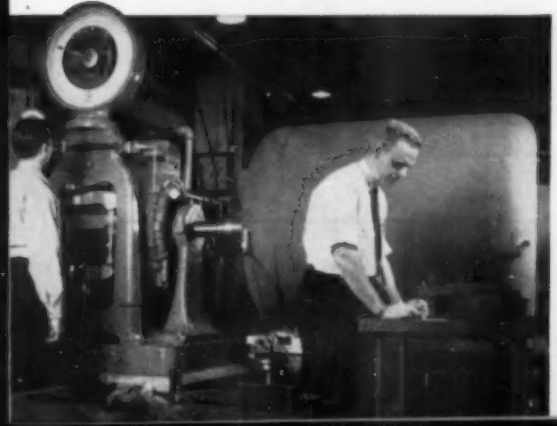
For big fans, blowers, pump drives—heavy duty applications where you need large motors with highly effective cooling systems for long life—choose Wagner Tube Ventilated Motors.

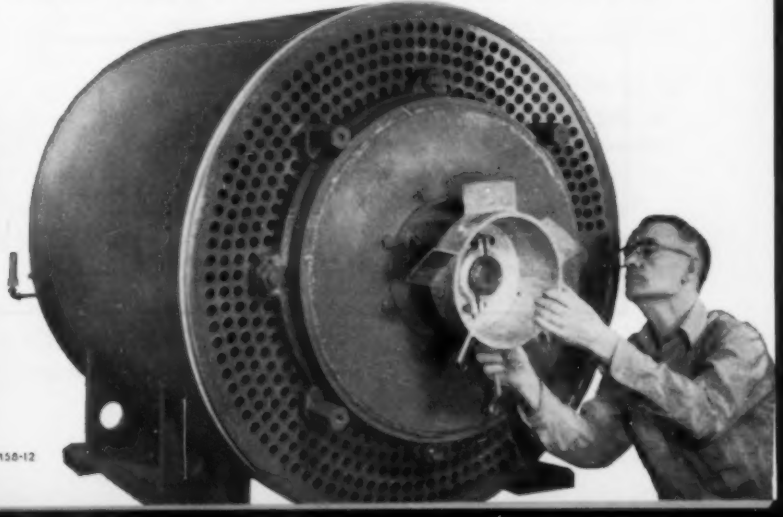
These motors have fabricated steel frames that are provided with a series of tubes through which cooling air is forced by an external blower. Internal blowers, one at each end of the rotor, circulate the warm air inside the motor through ducts in the rotor and stator and around the cooling tubes. This effective cooling system holds the operating temperature of the motor within the specified limits of 55° C Rise for Class A or 75° C for Class B insulated motors.

Wagner tube ventilated motors are available as Type YP, standard TEFC, with Class A or Class B insulation; or as Type ZP, explosion-proof, with Class A insulation only. Type ZP motors can be supplied with Underwriters' Labels for Class I, Group C or D, or for Class II, Group E, F or G locations. Let your Wagner Sales Engineer show you how these motors can solve your big motor problems.

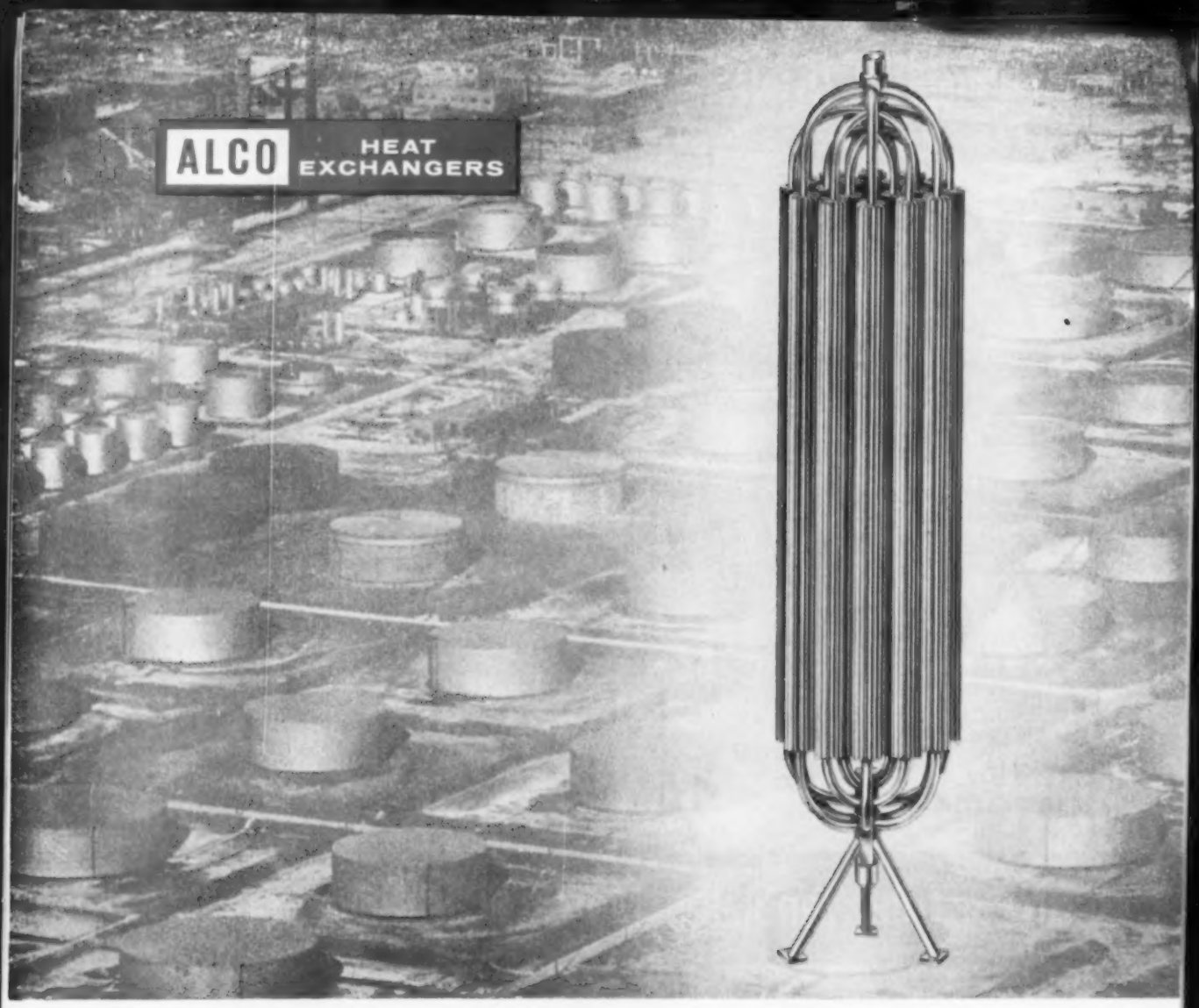
WAGNER ELECTRIC CORPORATION • 6389 Plymouth Ave., St. Louis 14, Mo.

This 400 hp tube ventilated motor is being tested on a 1000 hp dynamometer at the Wagner plant. Photo of motor at right, with blower shield removed, shows cooling tubes and external blower.



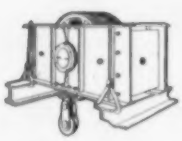


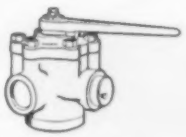
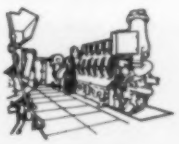
WM58-12



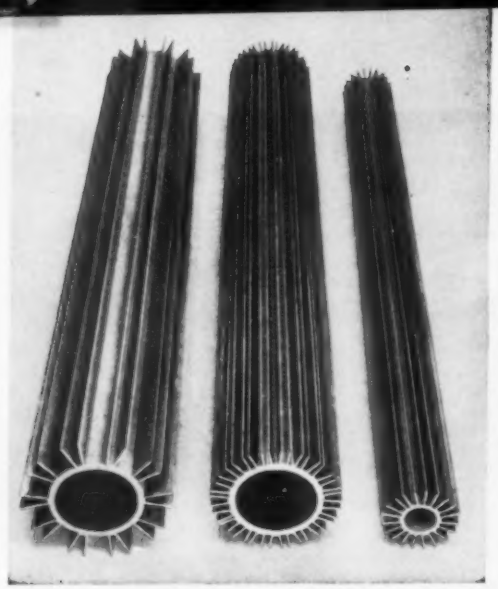
ALCOHEATER's *fin tubes provide high rate of heating for easier transport of viscous fluids. Design promotes thermal circulation. Unit can be passed through standard manhole for easy installation.*

ONLY NEW ALCO FINNED TUBES

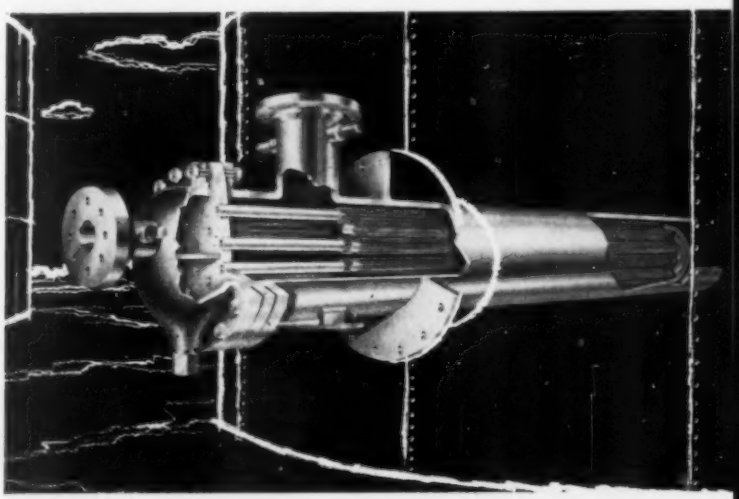


Crown and travelling blocks • *Oil-field valves* • *Wellhead equipment* • *Kinney plug injectors* • *Diesel-electric power package*



ALCO's *new welding process allows wide range of fin and tube metallurgy. Recent installation combined copper fins with Admiralty tubes.*



Tank suction heater by ALCO *uses fin tubes for straight-line heating with minimum pressure drop. Cool fin surfaces resist coking or fouling.*

MEET ALL PROCESS CONDITIONS

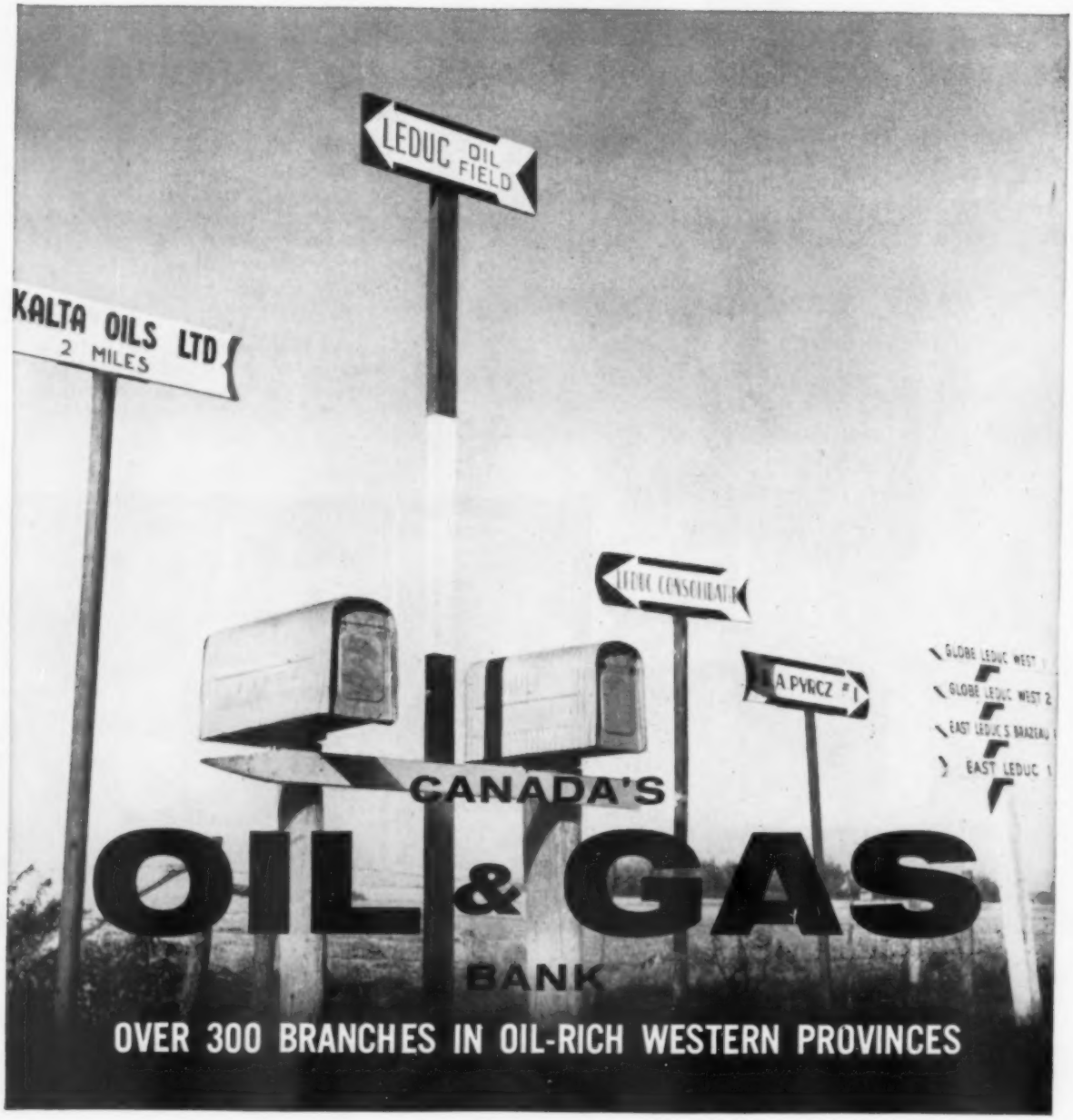
Using a new welding method, ALCO is producing integral fin tubes that have a higher heat-transfer efficiency. Longitudinal fins are welded to the tubes with a positive metal-to-metal union throughout their entire length. There are no spaces between fin and tube to lower heat transfer, and complete contact is assured throughout thousands of heating and cooling cycles.

ALCO is now using these improved fin tubes in exchangers like the ALCOTWIN®, ALCOHEATER and tank suction heater. The high heat-transfer rate, greater surface area, and resistance to coking or fouling combine to make these units highly efficient, flexible and easy to maintain.

The new integral fin tube is manufactured in a wide range of metallurgies for your process requirements. Complete information is available from any ALCO sales office, or write Petroleum Industry Equipment Division, Dept. 182, Bank of the Southwest Building, Houston, Tex.

ALCO

ALCO PRODUCTS, INC.
Petroleum Industry Equipment Division
HOUSTON



Why has Canada's largest bank, the Royal, earned its reputation as Canada's "Oil and Gas Bank"? For one thing, it operates over 300 branches throughout the oil and gas rich Western provinces, each able to supply all the banking facilities you are likely to need. For another, a special Oil and Gas Department in Calgary, staffed by experienced "oil bankers," is exceptionally well organized to provide information and practical assistance to oil and gas men.

This department's Special Bulletin Service can be of great assistance to those interested in entering the industry as well as those already established. For an up-to-date list of Oil and Gas bulletins, covering regulations, tariffs, statistics, financing and other related topics, write The Royal Bank of Canada, Oil and Gas Department, 409 Eighth Ave. W., Calgary, Alta.

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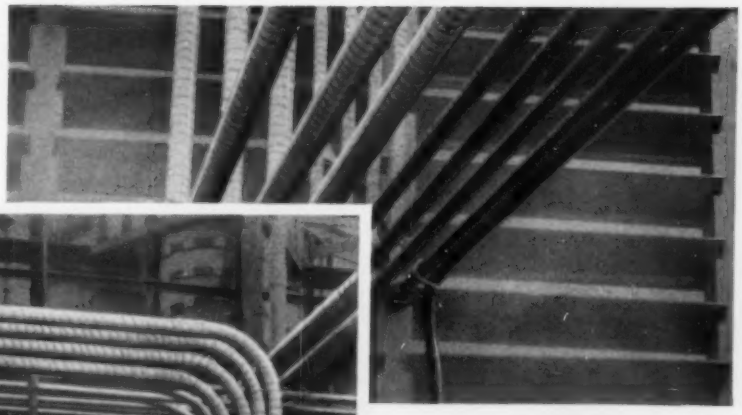
THE MODERN TOOL... AT WORK FOR MODERN INDUSTRY

to stop corrosion

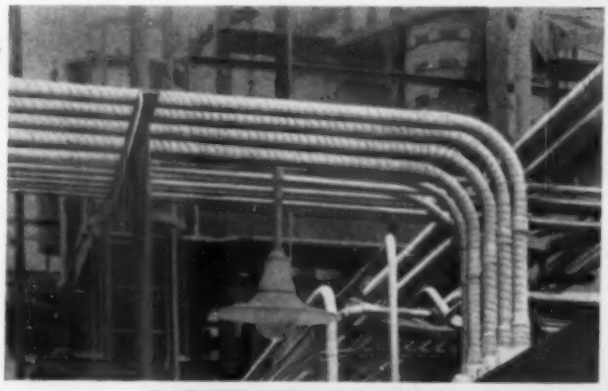
here

Polyken Protective Tape Coating is tough and long-lasting . . . that's why maintenance men prefer it to costly repainting.



or here

Polyken is polyethylene tape coating . . . elastic, inert, nondrying . . . offering stable protection under severe chemical conditions.



or here

Polyken's doubly thick adhesive system holds tight . . . seals voids . . . bonds to clean surfaces without a primer.

start here

(contact your local Polyken distributor)

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Chicago, Ill.: Sales Engineering, Inc.
Cincinnati, Ohio: Hare Equipment
Cleveland, Ohio: The Harco Corp.
Denver, Colo.: Patterson Supply Co.
Des Moines, Ia.: The Donald Corp.
Fort Worth, Texas: Plastic Engineering & Sales Corp.
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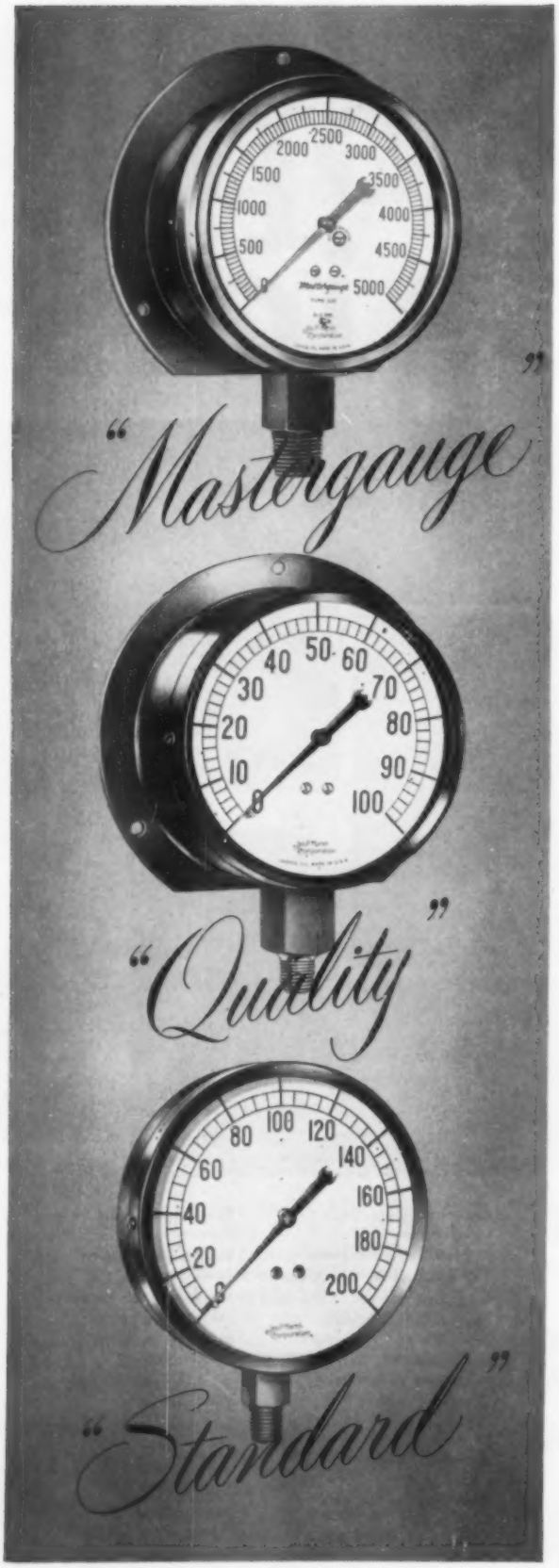
Experienced in modern PROTECTIVE COATING

THE KENDALL COMPANY
Polyken Sales Division



What pressure gauge for your particular need?

The clear-cut economical answer to your specific gauge problem is right here in the Marsh line. It is here because the Marsh line contains the world's most complete range of gauges in the three broad brackets of gauge applications.

THE "MASTERGAUGE" GROUP...for those extreme services that demand the ultimate in gauge precision, accuracy and stamina.

THE "QUALITY" GROUP...also for tough conditions, but less severe than the conditions served by the "Mastergauge" Group.

THE "STANDARD" GROUP...for the general run of pressure gauge services.

While these three brackets run a wide gamut of prices, the difference between them is not so much a matter of *grade* as a matter of *kind* and *purpose*. All gauges in all groups reflect Marsh precision and quality. Collectively they cover practically every conceivable gauge requirement.

The answer is in the catalog...but if you have a special problem let our engineering department work with you to select the most efficient, most economical solution to your problem.

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Sales Affiliate of Jas. P. Marsh Corp.
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MARSH

"THE STANDARD OF ACCURACY"

Tube-Turn fittings are typical of the line of quality equipment stocked and distributed through National's 130 stores.

You say you want complete stocks?

If you've had problems getting stock fittings and parts in a hurry, National Supply can solve them. Stop in and see the complete stocks of Tube-Turn fittings and other quality products we maintain . . . and take your time looking around. The doors and gates to our store, warehouse, equipment yard or pump shop are always open, and it will pay you to walk in and get better acquainted with our store people and the stocks they offer. We've built counters in the fronts of our stores for convenience—not as barriers.

As you walk back and around, you'll see ample stocks of products like these Tube-Turn fittings, Rockwell-Nordstrom valves, Ajax Engines, Oilmaster pumps and Link-Belt chain. The list of outstanding equipment is a long one, and we're pleased to be associated with every name on it.

More important than complete stocks is the fact that this is equipment you can use to operate profitably. Having it ready for you, when and where you need it, is our business, and we have 70 years of experience in it.

The next time you stop in a National Supply Store, shop behind the counter, too.

NATIONAL

"Extras" and "Special Features" in other units are STANDARDS in National Pumpers!

EXAMPLE: ACCURATE COUNTERBALANCING Because of the geometric and concentric design of cranks and counterweights, National Pumpers allow the best counterbalance—at a leading or lagging condition *as well as at mid-stroke*—you can obtain today. Counterweights can be quickly and safely adjusted by one man, in a method that's far superior to slab adding or subtracting systems.

EXAMPLE: GEAR REDUCER DESIGN—National gear reducers meet or exceed all API specs, and can be rotated in either direction. This permits more latitude on prime mover placement, and extends the life of the reduction unit. Other units without proper geometric design or with one-direction lube systems can't use reverse rotation for these benefits.

EXAMPLE: GROUND LEVEL LUBRICATION—This is a desirable *standard* safety and convenience feature in all National Pumpers for which you pay no extra charge.

EXAMPLE: ARC HANGER DESIGN—National's arc hanger has a hinge which allows you to fold it back for unhindered well servicing. It also has self-adjusting features which prevent side loading, polish rod bending and excessive wear on stuffing box packing. Many other pumpers lack these practical, economical features.

EXAMPLE: CRANKS—The gear reducer is placed on sub-base on crank-counterweighted National models. This places it at a height which prevents the weights from traveling below the unit base, and thus eliminates side pit digging for proper clearance. Split cranks are used for easy field removal and replacement—no solid cranks to cause extended down time, transportation and machine shop expenses.

EXAMPLE: BEARINGS—National provides the best frictionless bearings for the loads and motions involved in pumping unit operation—straight or tapered style roller bearings on all fully rotating shafts, and proven needle type bearings at points where limited or oscillating motions are present. These bearing selections mean minimum horsepower losses through the unit and greatly increased bearing life.

EXAMPLE: DUST SEALS—National Pumpers have dust excluders on all bearings to improve the life of oil seals and bearings. Dust seals on shafts rotate with, but do not touch, the shafts, and are extremely efficient.

EXAMPLE: OVERALL STABILITY—National Pumpers have wide spacing of the samson post's four legs plus cross bracing. This makes them far less susceptible to twisting or stressing due to improper unit setting than units of small leg spread, three-leg construction or without cross bracing.

There are many more specific examples which prove that the best pumper investment for lowest operating costs is National. The National man in your area will tell and show them to you any day you choose.

National Pumpers are available in 22 standard API sizes, plus several long stroke and portable variations.

More National equipment for profitable production on next page

Precision manufacturing operations and painstaking inspection methods insure the traditional quality in every finished National Rod shipped to the field.

You get low-cost sucker rod service with a National String!

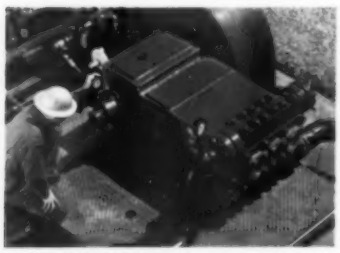
There are three main reasons. National Sucker Rods are:

1. **ENGINEERED** for maximum resistance to shock, corrosion, fatigue and impulse loads.
2. **QUALITY-CONTROLLED**—from laboratory testing of sucker rod steels to final shipment inspections—to give you the ultimate in uniformity, dependability and economy.
3. **PRECISION-MANUFACTURED** on specially-developed machines—in accordance with the strictest specifications in the industry.

National Rods reach you in factory condition, too, whether you get them from National Supply Store stocks or directly from the mill. National's careful methods for stacking, handling, shipping and field storage have been proved by hundreds of shipments to all parts of the world.

Of course, National has a rod grade for every well condition—normal, mildly corrosive, heavy corrosive or sulphide wells. National Hollow Sucker Rods and Plastic-Coated Rods are also available for special conditions.

From any standpoint, the choice of a National Sucker Rod string means low-cost sucker rod service. You'll find it worthwhile to review your rods needs with the National Supply field man in your area.

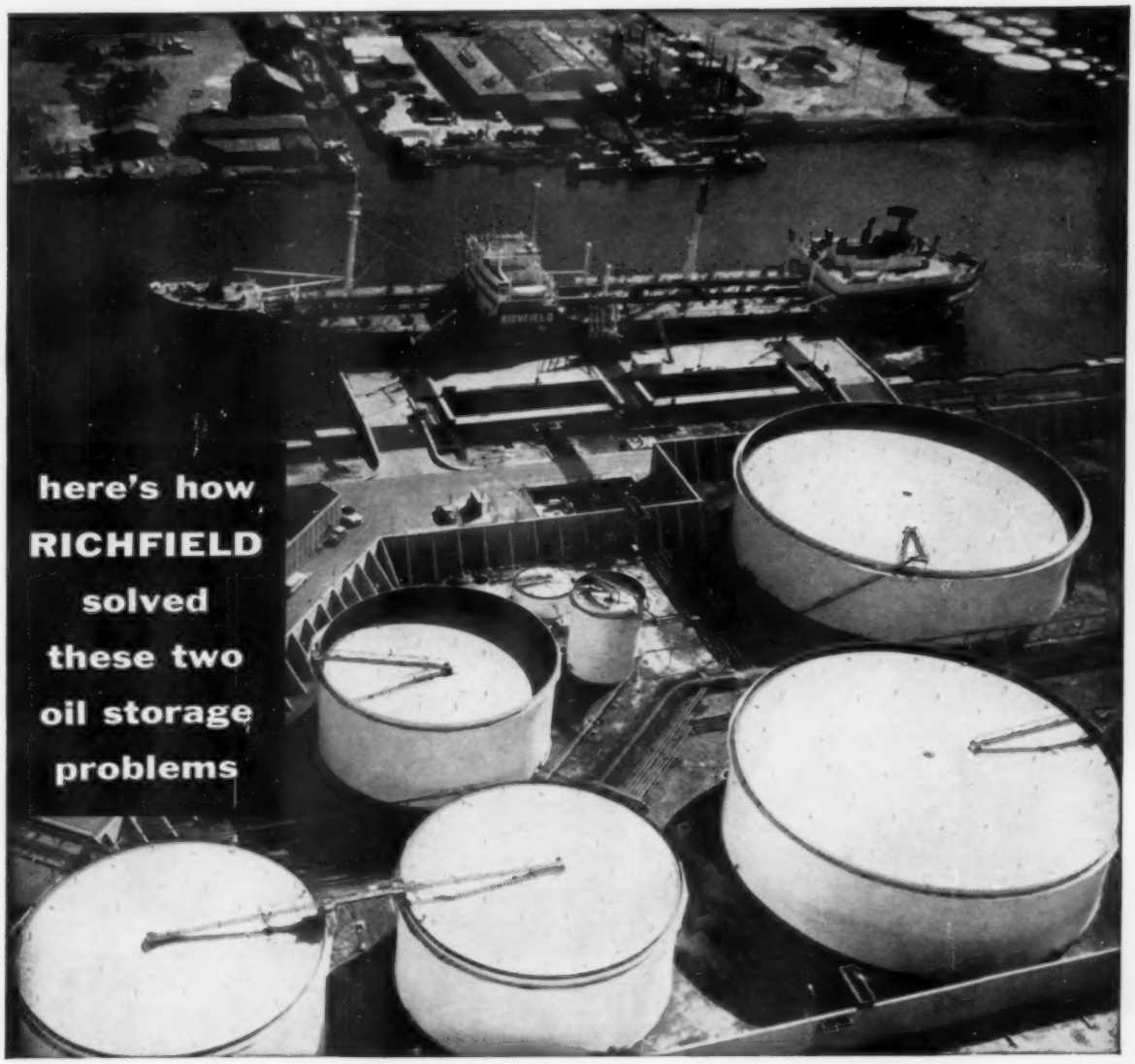


National Triplex Pumps are reliable on a host of oilfield pumping jobs including waterflooding, salt water disposals, formation fracturing, and as power-oil sources for subsurface hydraulic pumps.

National Wellhead Equipment features interchangeable units which provide many combinations for your specific size, capacity and type needs. Ease of assembly and pre-tested safety are two of its outstanding advantages.

National Plunger Lift can be the best production method for certain types of wells. It uses formation gas or injected gas for operation, has low initial and service costs. Equipment is also available for gas well operation to remove liquids and maintain a uniform and increased flow rate of gas.

THE **NATIONAL SUPPLY** COMPANY
Two Gateway Center, Pittsburgh 22, Pa.
DIVISION OFFICES: Calgary, Dallas, Denver, Houston, Toledo, Torrance, Tulsa
EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; City Wall House, Chiswell Street, London E.C. 1



1. Fire Hazard 2. Vapor Loss

Here is an investment by Richfield Oil Company that pays off in safety and conservation. It is a seven-tank addition to Richfield's Marine Terminals that adds half a million barrels capacity. The tanks, built by General American, are equipped with Wiggins Floating Roofs with Wiggins Safety Seal that stops vapor loss and protects from rim fires.

Wiggins Double-Deck Floating Roofs with the Wiggins Safety Seal, reduce vapor space under the circumferential fabric to an absolute minimum. This practically eliminates losses due to thermal breathing and serves to prevent rim fires. The fabric is of a new, long-lived type and a special weather-hood protects it from the sun. The seal mechanism is always out of the liquid and the corrosive vapor space. Only the Wiggins Safety Seal gives you all these advantages.

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GENERAL AMERICAN
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Offices in all principal cities
It pays to plan with General American

Conduit box can be located top, bottom, or either side.
Control hand wheel can be positioned on top or either side.
All end-bracket assemblies are interchangeable for repositioning of drive components.
GET ALL THESE VARIATIONS FROM ONE BASIC DESIGN
— with wrench and screwdriver!
Output shaft can be high or low, right or left.
Motor can be mounted top or bottom.
Detachable feet can be bolted to bottom, side, or top for floor, wall, or ceiling mounting.
Just two of many variations that can be made from a standard ALLISPEDE DRIVE.

The ALLISPEDE* DRIVE gives you complete field versatility!

It's the most flexible and precise mechanical adjustable speed drive made . . . and the only one that can be fully adapted in the field!

The *all-new* ALLISPEDE DRIVE is the answer to any motor application that calls for low-cost adjustable speed. It permits smooth, easy speed adjustment — and maintains it exactly. Its modern design permits unusual field-flexibility — lets the user change the unit *any time* to suit his various requirements.

The a-c ALLISPEDE DRIVE is the *only* drive that can be fully adapted in the field by the user. The basic unit goes together like building-blocks . . . feet, end brackets, control hand wheel, conduit box, and output shaft can be relocated in minutes to fit existing space limitations. The same unit can be changed from an upright to a horizontal drive for floor, wall or ceiling mounting. And all you need is a wrench and screwdriver!

Superior design improves drive efficiency and extends service life. The four bearings equally distribute belt load, increasing bearing and belt life. Movable discs slide smoothly on internally-lubricated splined shafts — won't stick in place or wear. Belt changes are faster — never disturb the dial or adjustment mechanism. Rugged cast-iron housing with plated steel covers shields drive against dirt and corrosion . . . integral rotor fan cools the motor and force-ventilates the drive housing to extend bearing life. Oversize cartridge bearings are pressed on shaft and lubricated at the factory. Corrosion-resistant stainless steel nameplates diagram proper motor connection, specify bearing sizes, and carry complete instructions for operation and lubrication.

The ALLISPEDE DRIVE can be supplied with in-line or right-angle integral gears, brake and tachometer. Sizes from 1 to 20 HP with speed variations up to 8:1. Electrical and mechanical modifications are available to meet special requirements for any application.

Contact your Louis Allis District Office or Distributor for complete information and engineering assistance. Or write for Bulletin 3300, The Louis Allis Co., 449 E. Stewart Street, Milwaukee 1, Wisconsin.

ALLISPEDE is a trademark of The Louis Allis Co.

ASD-118

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MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

Why yesterday's gasolines won't power today's cars . . .

Your modern car is a high-precision machine—made possible by high-precision gasoline. Especially refined and formulated for high-compression engines, it is this gasoline that gives today's car its smooth, knock-free power.

Extremely important in the vast strides made in gasoline refining are the services furnished the petroleum industry by Universal.

Development of increasingly effective processes and products for producing cleaner-burning, high octane gasoline . . . training of refinery personnel . . . comprehensive field and laboratory service to help the refiner achieve peak operating efficiency and product quality . . . these are among the services rendered by UOP to petroleum refiners the free world over.

It is through services like these that today's gasoline and today's cars have reached their high standards of performance.

UNIVERSAL OIL PRODUCTS COMPANY

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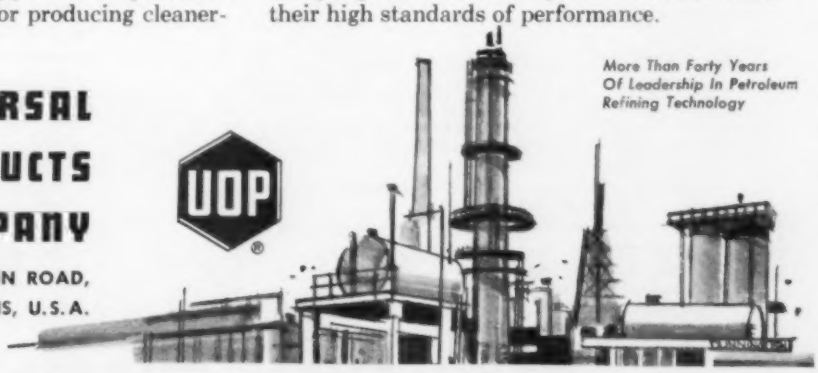
More Than Forty Years Of Leadership In Petroleum Refining Technology



BETHLEHEM'S BIGGEST . . . 640,000 in.-lb torque

This is the largest of Bethlehem's many pumping units—the 640D. With a torque capacity of 640,000 in.-lb and a maximum stroke of 168 in., this giant makes possible deep-well pumping at rock-bottom cost. Designed for slow, long-stroke operation, it easily handles wells to depths of 10,000 ft and more.

Other Bethlehem units are offered in every size and type ever required for lesser depths. The choice is so wide that proper capacity is always available, no matter what the pumping problem. Call our nearest office for full details.

WHY A BETHLEHEM PUMPING UNIT IS YOUR "BEST BUY"

Capacities available from 6,400 to 640,000 in.-lb torque.

Polished-rod load capacities from 2,000 to 33,000 lb.

Range of strokes from 16 to 168 in.

Completely crank-counterbalanced — no additional beam weights necessary for deep wells.

Unsurpassed mechanical and structural features, including the following:

Adjustable rotary counterbalance with safety lock. Adjustments can be made with cranks in one position.

Full roller-bearing gear reducer with precision-cut forged-steel gears. Flood lubrication. Settling chamber.

Hydraulically removable wrist pin; quick change of stroke. Wrist-pin bearings are self-aligning spherical roller.

Step-down walking beam, providing equal torque loading in either direction.

Saddle bearing of one-piece construction to prevent misalignment.

Surfaces of structural members shot-blasted and primed to assure maximum paint durability.

Built-in ground lubrication with relief valves at pressure-lubricated points.

Arc-type removable horsehead.

Four-leg Samson post. Knockdown type provided for export.

Large, powerful clamshell brake.

Any type of prime mover—electric motor, medium-speed horizontal engine, high-speed multicylinder engine.

Reinforced base. All types prime-mover extension bases

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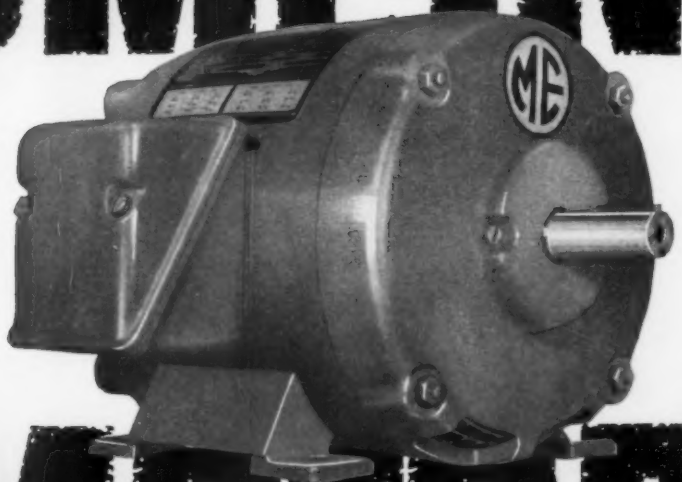
BETHLEHEM SUPPLY

BETHLEHEM STEEL

BETHLEHEM SUPPLY

PUMPING MOTORS

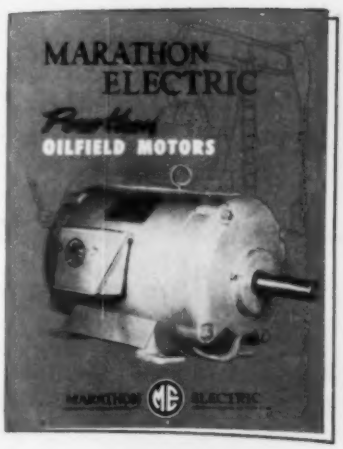


designed for the oil industry

Every single service requirement for oil field use has been considered in designing Powrthon electric motors. That's why they *really* deliver trouble-free performance throughout their long life.

Get all the facts *now* on Powrthon Motors!

Read about their drip-proof, splash-proof, weather-protected enclosures with guarded openings . . . special insulation for oil fields . . . specially engineered cooling system . . guaranteed service factor and other detailed information. For maximum interchangeability, A.C. and new D.C. ratings are available in the same Powrthon frame. Write for Booklet No. SB-176 today. *Marathon Electric Manufacturing Corporation, Wausau, Wisconsin.*



Motors and generators—that's our business!

Motors from 1/20 HP to 3500 HP
Generators from 1/2 KW to 2500 KW

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Home Offices and Factory, Wausau, Wis. • Factories at Erie, Pa. and Earlville, Ill. • Sales Offices in Principal Cities

"Public understanding of what American oil companies are doing overseas and why their work is important to every citizen is to be desired. We would like more people to know about our activities. We would like them to realize we try to be good guests in host countries. We would like them to appreciate that our operations represent the American brand of private enterprise in many critical areas where the demonstration of these principles has a great effect upon our country's relations with the rest of the world."

M. J. Rathbone, President, Standard Oil Company (New Jersey)

Esso

STANDARD OIL COMPANY (NEW JERSEY)

AND AFFILIATED COMPANIES

They Say—

Optimization with IBM's 650

Dear Sir:

In the newsletter of your October 13 issue, mention is made of the use of an IBM 650 computer to optimize operations of an entire refinery. In this connection, you state that although computers have been used for simulation for some time, this is the first refinery-wide use of optimization.

While I do not wish to disparage the accomplishment of achieving this objective on an IBM 650, I would like to point out that complete refinery optimization, through the use of linear programing techniques, is currently being used as a routine tool by several refiners.

In at least two cases, the use of linear programing for study of overall refinery operations, as contrasted with gasoline blending and production studies, dates back over 1 year.

As I mentioned, accomplishment of this job on an IBM 650 represents quite an achievement since most of the work referred to in the preceding paragraph was done on IBM 704 computers.

J. S. Bonner
Bonner & Moore Engineering Associates
Consulting Engineers
Houston.

Who holds open-hole record?

Dear Sir:

Your article on page 33 of the September 29 issue states that the world's record for open hole is nearly 12,000 ft.

We are drilling a well with over 12,000 ft. of open hole. Please advise us of current open-hole record.

E. L. Shafter
Vice President, Production
Hudson's Bay Oil & Gas Co., Ltd.
Calgary.

(Editor's note: The world's record is uncertain. Longest open-hole claim now on hand: 12,151.8 ft., in Comanche County, Oklahoma, in 1951. Any longer ones?)

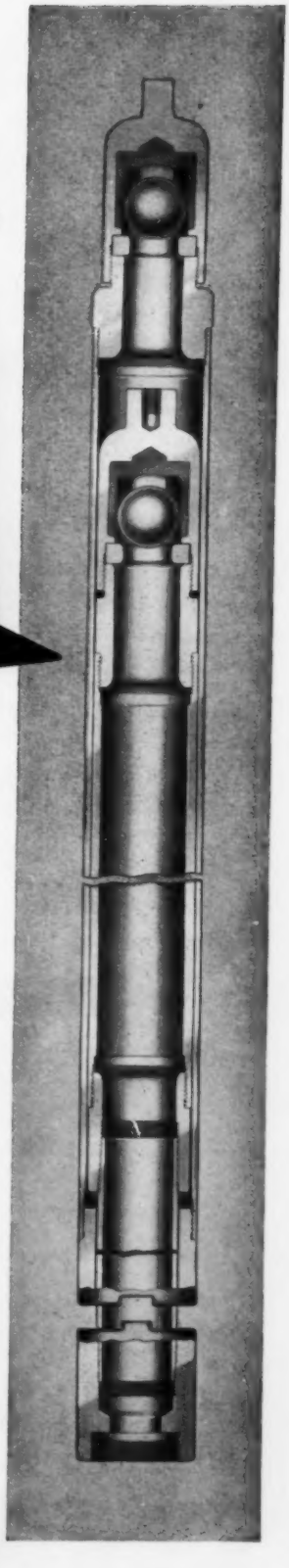
Low-cost computer left out

Dear Sir:

We have read with interest your article on data-logging techniques in

*Designed for Your Waterflood**

*WITH THIS PACIFIC INSERT ROD PLUNGER PUMP YOU GET VOLUME *plus*



1 A precision insert rod pump of 4½" O.D. x 3¾" I.D. built to Pacific standards.

2 A specifically designed pump for pumping large volumes of fluid efficiently **at any speed**—fast or slow—with a conventional pumping unit installation.

3 A pump that will seat in a regular production casing packer and may be operated in 5" casing (or larger) thereby eliminating tubing.

4 A pump ideally suited for pumping water supply wells in the range of 2000 to 3000 barrels of fluid per day for water flooding operations.

5 A pump equipped with Pacific Pacilite chrome plungers and the latest design rubber lined cages for long trouble-free operation.

Ask your Pacific field salesman for more details or write:

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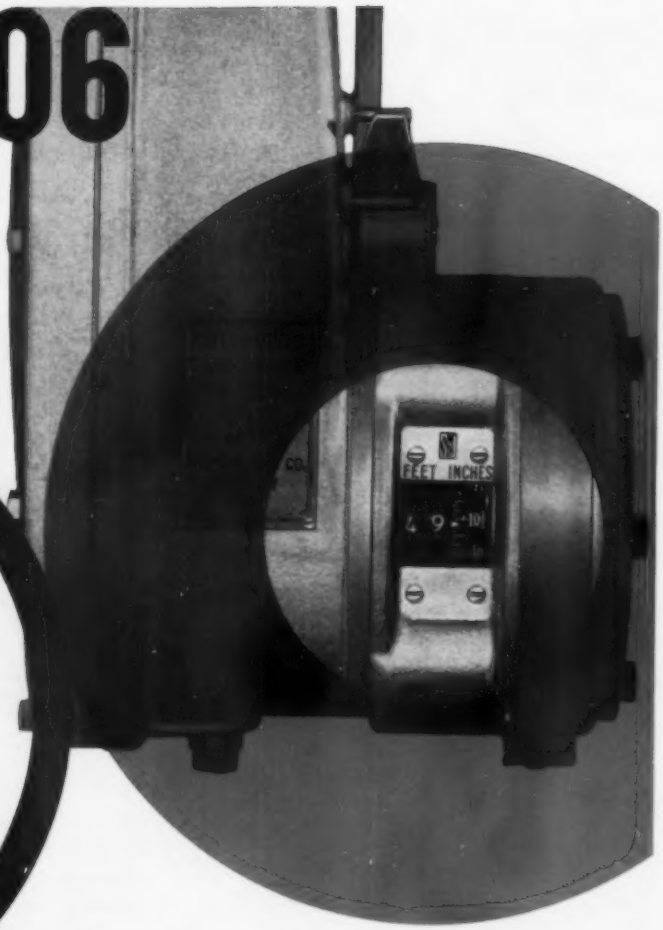

EASIEST TO READ— MOST ACCURATE GAGE EVER!

2006 contains these gagers "most wanted" features:

Large, white numbers on black for maximum visibility and accurate readings. Teflon bearings for minimum friction, greater gaging accuracy. Superior quality components, precision machining, clean, modern design for dependability and service. Rugged construction, minimum maintenance. Simple, fast adjustment. Easy attachment of transmitters for remote reading systems. These are some of the exclusive S&J features that make 2006 a major achievement in tank gages. Write for details today.

SHAND AND JURS — GENERAL PRECISION EQUIPMENT CORPORATION — GPE

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4825

A Subsidiary of General Precision Equipment Corporation
Branch offices and representatives in principal cities

the October 13 issue of The Oil and Gas Journal (p. 91).

We are distressed, however, to see the concentration of articles on Beckman systems and the omission of any mention in this series of the operating guide and data-logging system which recently went on line at Esso's Baton Rouge refinery.

This system was built by Leeds & Northrup and uses as its control and computing heart our LGP-30 general-purpose computer. We think this installation is noteworthy because it is a comparatively simple adaptation of a mass-produced, low-cost digital computer to a field where computers are usually expensive custom machines.

The Esso-L&N, LGP-30 system measures 160 variables, then computes 27 operating guides such as catalyst circulation rate, carbon burning rate, and material balance. In addition, it also serves as an automatic data logger, printing out off normal conditions, furnishing, on demand, hourly and daily log sheet summaries of process operation.

I. Switzer
Computer Applications Analyst
McBee Co.
Edmonton, Alta.

Out to make a profit

"It is high time that we take the offensive on the subject of profits—to get before the public the true story of what profits we make and where they go. For if the people do not understand the function of profits, they will not understand anything else we do.

"Profits are vital to the continuance of an enterprise and the direction it takes. In our industry they serve as a most important method of accumulating funds which are needed for new capital investment.

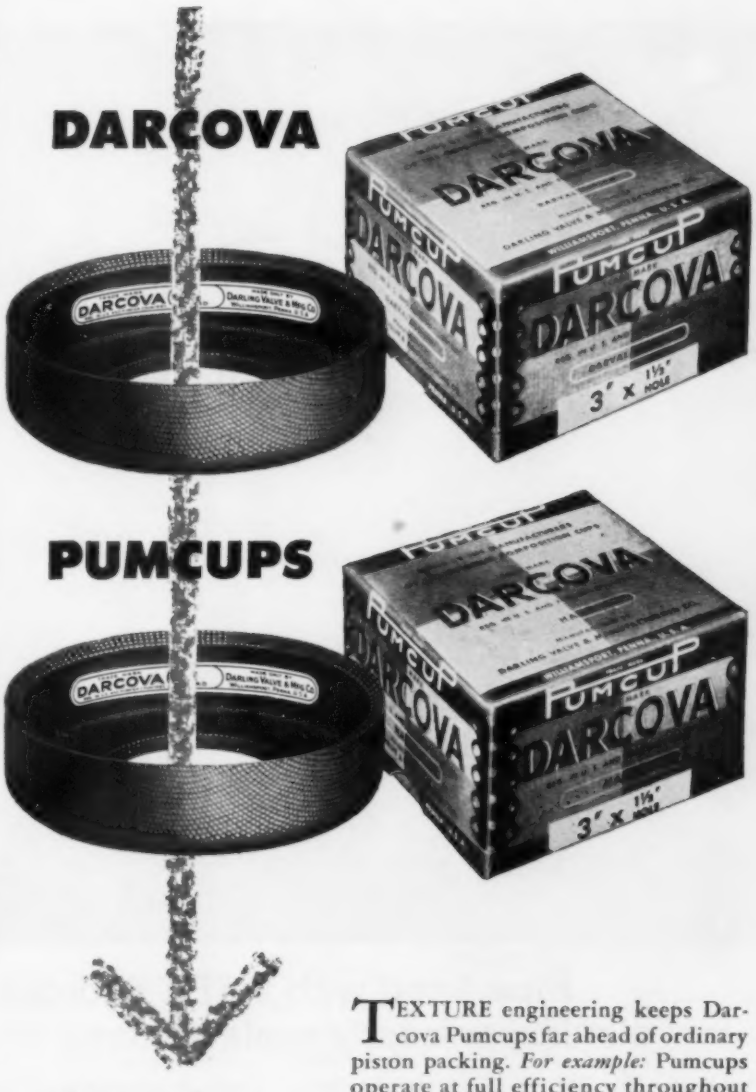
"When they become large, profits signal the need for expansion in those lines of production in which demand is increasing. On the other hand, when they shrink they indicate a need for contraction or a reappraisal of the course the business is taking.

"Profits give people an incentive to invest their savings in those enterprises which will produce goods and services that the rest of us want and are able to buy.

"They stimulate expansion and competition, thus providing more and better goods at lower prices.

"They guide and regulate the flow of capital funds and provide a yardstick of the efficiency of business managers.

"In short, profits realized legally and in harmony with competitive en-



...famous for

- PUMPING EFFICIENCY
- LOWER COST
- LONGER SERVICE

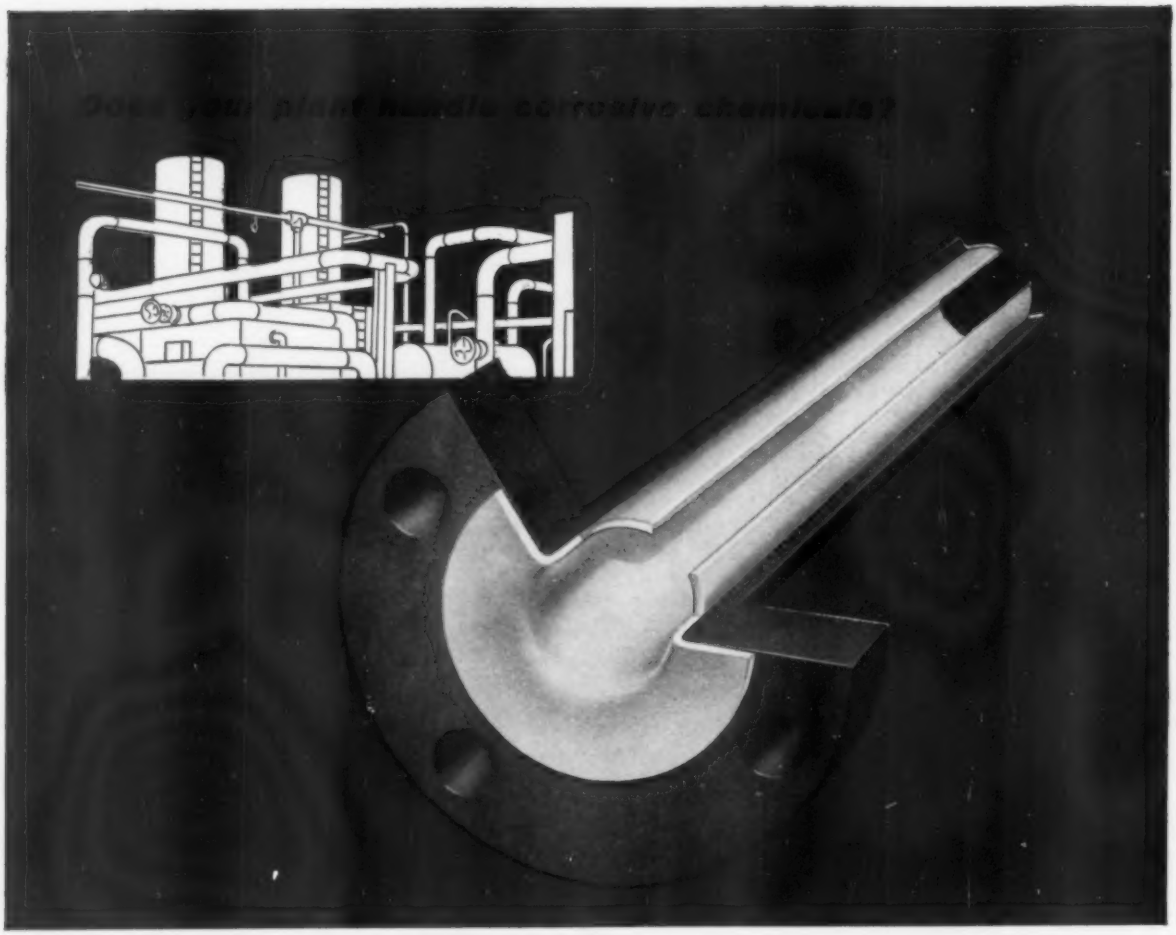
TEXTURE engineering keeps Darcova Pumcups far ahead of ordinary piston packing. *For example:* Pumcups operate at full efficiency throughout their entire life. Fluid slippage is virtually eliminated.

Moreover, you can count on much longer service . . . users report Darcova Pumcups outlast other packing at least 3 to 1!

Write for all the facts on Darcova efficiency: Bulletin No. 5503 on Pumcups for air and hydraulic mechanisms and Pumcups for reciprocating pumps.

DARLING VALVE & MANUFACTURING CO.
Williamsport 1, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP
PUMCUPS



Pipe lined with a TFE-fluorocarbon resin eliminates costly replacements and maintenance

Pipe lined with a TEFLON TFE-fluorocarbon resin can save you money by substantially reducing process shutdown, pipe replacement and system maintenance. It will increase plant safety by eliminating the hazard of corrosion-caused leaks and disassembly of chemical lines.

TFE resins withstand the most corrosive chemicals used in the petroleum and petrochemical industry. For example, sections of this lined pipe were installed in an aqueous process stream carrying HCl liquid and vapor, plus organic solvents and reagents at temperatures above 220°F! After more than two years, inspection showed their condition to be so good that they were reinstalled under even more severe conditions. Because of this outstanding performance, the plant has greatly extended the use of TFE-lined pipe.

A TFE-resin pipe liner has many other advantages. It is rated for use up to 500°F. It won't shatter under vibration or physical or thermal shock, like brittle lining. The non-adhesive properties of TFE resins make them ideal for handling sticky or viscous substances. The liner flared over the flanges provides complete protection for the metal from the process fluids and eliminates the need for additional gasketing. And now you can get a complete assortment of standard sizes, flanged pipe, tees, elbows, and reducers, all lined with TEFLON TFE resins.

For long service life, greatly reduced maintenance and downtime, and greatly increased plant safety, install pipe lined with TEFLON. Call your local pipe supplier for the details. Or, for more information, write to: **E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department, Room 2811, Du Pont Building, Wilmington 98, Delaware.**

IN CANADA: Du Pont Company of Canada (1956) Limited, P. O. Box 660, Montreal, Quebec.

DU PONT TEFLON®

TFE-FLUOROCARBON RESINS

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

TEFLON is Du Pont's registered trademark for its fluorocarbon resins, including the TFE (tetrafluoroethylene) resins discussed herein.

terprise principles are the mark of successful service to the consuming public. As long as profits are permitted to perform such functions our economy will remain dynamic and strong.

"If we can demonstrate that business is actually 'out to make a profit,' —to borrow an expression from our critics—and why it must do so if it hopes to survive, I believe we will accomplish a great deal . . ."

Robert G. Dunlop, president, Sun Oil Co., in a speech to the Virginia Oil Men's Association.

Sure road to higher prices

"Elimination or reduction in the rate of percentage depletion can only lead to higher—and in my opinion drastically higher—prices for petroleum products. The people should be warned and constantly reminded that any weakening of the percentage-depletion provision will imperil this nation by jeopardizing the maintenance of its domestic oil reserves.

"If I were Khrushchev or one of the other communist leaders, foreign or domestic, I would be in the forefront of those demanding that percentage depletion be repealed, or at least drastically reduced. For it would be easier, cheaper, and safer to reduce America's oil reserves by that device than by going out and bombing the oil fields.

"Weakening the percentage-depletion provision in America's tax law is one of the surest ways I know to weaken America itself."

Bernard L. Majewski, president, Signal Perfect Fuels, Inc., in a speech before a joint meeting of the Houston Chamber of Commerce and Downtown Rotary Club, Houston.

Oil prices hold the line

"Within the past 5 years, oil field machinery prices have advanced 23.4%, oil well alloy casing 48.5%, and oil production wages 25%.

"And yet—and this is the sort of information it is so important for the public to know—during the same 5-year period the price of crude oil has increased only 10.7%.

"I contend this represents a truly remarkable record of holding back prices in the face of steeply rising wage and material costs. When such necessities behind price advances are widely understood, even irresponsible people may hesitate to brand us 'price gougers'."

C. J. Guzzo, marketing vice president, Gulf Oil Corp., in a speech before the Miami, Fla., Rotary Club.

Another "Quality Controlled" application of Teflon by Doré

TEFLON* LINED ELLS
By DORÉ
PAT. PENDING

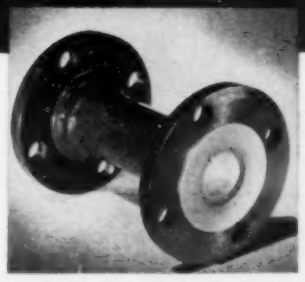
Liner molded to shape...not deformed

The pure, white Teflon liner, 1/8" thick, is precision molded in one piece. It is smooth, tough, dense . . . free of holes and has no welds. The flange seals are molded integrally with the liner. Covering the entire raised face of the flange, the seals are smooth and flat . . . not wavy. They seal without the use of an extra flange gasket.

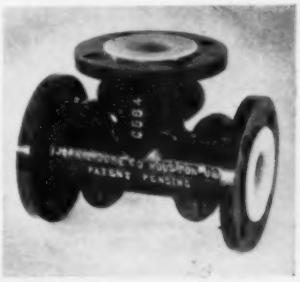
Ells are ductile iron with flanges drilled for 150 psi. They are available in sizes 1" through 6". RATINGS: Pressure - 400 psi.; Vacuum - full; Temperature -90°F to 500°F.

Specify pipe and fittings lined with Teflon by Doré for corrosion-free, contamination-proof piping for a wide range of commodities. Write for Bulletin K-57-A for complete information and specifications.

*Du Pont's registered trademark for fluorocarbon resins, including tetrafluoroethylene resins.



Schedule 40 carbon steel pipe is lined with extruded Teflon, 1/8" thick. Available in sizes 1" through 6", lengths to 10 ft.



Tees lined with 1/8" Teflon are ductile iron, have standard face to C/L dimensions. Liner, including flange face seals, are one-piece molded Teflon. Tough, dense, smooth, free of holes and without welds.

John L. Doré Co.
5406 SCHULER • P. O. BOX 7772 • HOUSTON 7, TEXAS
EXPORT: 1505 RACE ST. • PHILADELPHIA 2, PA., U. S. A.
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SALES ENGINEERS FOR JOHN L. DORE, INC.
DU PONT'S TEFLON HI-QUALITY NYLON

MEMO
George—
flange gaskets in hot oil line deteriorating rapidly under attack by refinery chemicals
IDEAS?
Bob
MEMO
Bob -
GASKETS OF R/M K-68 ARE THE SOLUTION.
K-68 is an R/M compressed asbestos sheet packing with Neoprene compound binder. Provides outstanding performance with hot oils and solvents of the gasoline and toluol types.
George

You can rely on Raybestos-Manhattan for the gasket materials to meet any of your needs. R/M K-68,® for example —for high pressures and temperatures, cold oil, carbon dioxide and ammonia.

In addition to K-68, R/M manufactures other Neoprene-compounded sheets in a wide selection of hardnesses and densities. Also meeting difficult requirements is R/M No. 10,000, the strongest compressed asbestos sheet packing on the market. Made entirely of Canadian long crude asbestos fibers and the best grade of natural rubber, its average tensile strength is 10,000 psi. In another category, asbestos cloths impregnated with "Teflon"* resist attack by all known industrial acids and caustics, and sheets of pure "Teflon" are impervious to such attack.

R/M engineers have amassed a wealth of experience in manufacturing packings and gasket materials to satisfy the most exacting requirements of the petroleum industry. This experience is at your disposal—call on R/M!

R/M MAKES A COMPLETE LINE OF MECHANICAL PACKINGS—including Vee-Flex, Vee-Square®, Universal Plastic, and "versi-pak"®; GASKET MATERIALS; "TEFLON" PRODUCTS. SEE YOUR R/M DISTRIBUTOR.
*A Du Pont trademark

R/M PACKINGS
RAYBESTOS-MANHATTAN, INC.
PACKING DIVISION, PASSAIC, N.J.
MECHANICAL PACKINGS AND GASKET MATERIALS

RAYBESTOS-MANHATTAN, INC., Mechanical Packings • Asbestos Textiles • Industrial Rubber • Engineered Plastics Sintered Metal Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings Brake Blocks • Clutch Facings • Industrial Adhesives • Bowling Balls • Laundry Pads and Covers

CALENDAR OF EVENTS

NOVEMBER

10 Transportation Club of the Petroleum Industry, annual meeting, Bismarck Hotel, Chicago.

10-12 American Petroleum Institute, thirty-eighth annual meeting, Conrad Hilton, Palmer House, and Congress hotels, Chicago.

17-18 New Mexico Oil and Gas Association, thirtieth annual meeting, La Fonda Hotel, Santa Fe.

18 Chemical Institute of Canada, chemical economics subject division, meeting on "The Canadian Chemical Industry—Export and Growth," Sheraton-Mount Royal Hotel, Montreal.

18-20 Ninth National Conference on Standards, Hotel Roosevelt, New York.

18-20 National Conference on Air Pollution, Sheraton-Park Hotel, Washington, D. C.

19-21 Society of Petroleum Engineers of AIME, Venezuela petroleum sections, Caracas, Venezuela.

20-21 American Society of Civil Engineers, structural division and Kansas City section, conference on electronic computation, Kansas City.

21 Natural Gasoline Association of America, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex.

30-Dec. 5 American Society of Mechanical Engineers, annual meeting, Statler and Sheraton-McAlpin hotels, New York.

DECEMBER

1-3 Interstate Oil Compact Commission, annual meeting, Kansas City.

2-4 Asphalt Institute, annual membership meeting, Shoreham Hotel, Washington.

7-10 American Institute of Chemical Engineers, annual meeting, Netherland Plaza Hotel, Cincinnati.

9-13 National Association of Corrosion Engineers, University of Illinois, biennial short course on cathodic protection.

11-12 Mid-Continent Oil and Gas Association, annual advalorem tax forum, Hilton Hotel, Fort Worth.

JANUARY

22-24 Texas Society of Professional Engineers, annual convention, Shamrock Hilton Hotel, Houston.

23 Natural Gasoline Association of America, Oklahoma regional meeting, Biltmore Hotel, Oklahoma City.

28-29 Annual Midwest Welding conference, sponsored by Armour Research Foundation of Illinois Institute of Technology, and American Welding Society, Chicago section, Illinois Institute of Technology, Chicago.

FEBRUARY

1-6 American Society for Testing Materials, D-2 committee on petroleum products and lubricants, Sheraton-Jefferson Hotel, St. Louis.

2-27 Southwestern Legal Foundation, short

HERE'S PACKAGED PROOF!

OF THE GROUND BELOW THE RIG

There's no need for second guessing about productive strata when the evidence is right before your eyes. The new rubber sleeve core barrel delivers cores in a complete package even in soft, unconsolidated formations.

Formerly, soft formation cores were unobtainable due to grinding and drilling fluid wash. Now the rubber sleeve wraps them tightly, keeps them intact, and offers maximum protection against washing, blocking or friction grinding. Cores are delivered, "packaged as cut," ideal for analysis, handling and shipping.

Every dollar you invest in a well is spent for the sole purpose of discovering oil. For minimum risk in exploration, you must evaluate the formation below the rig. The only sure method of formation evaluation is coring. The development of the Rubber Sleeve Core Barrel has greatly expanded the area in which you can obtain the vital information you need to determine a productive field. With the addition of the soft formation rubber sleeve core barrel to a complete line of conventional and wireline barrels, Christensen has a core barrel to fit your needs, regardless of the formation type.

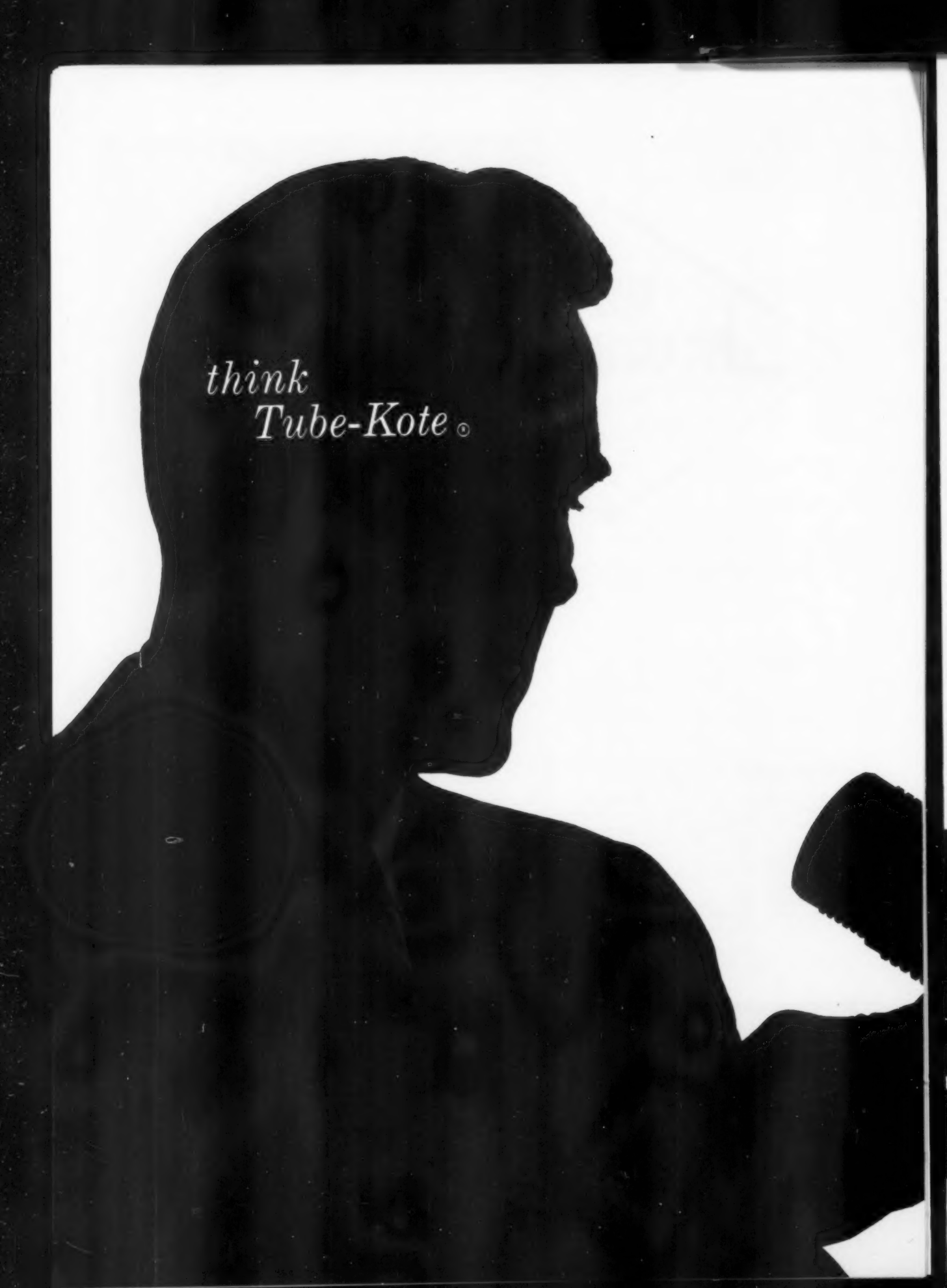
Call the Christensen representative nearest you and get the "Hole" story.

For more detailed information on the rubber sleeve core barrel, ask for RS-801. For additional information on conventional or wireline core barrels, ask for CB-608.
Write or call
Christensen Diamond Products

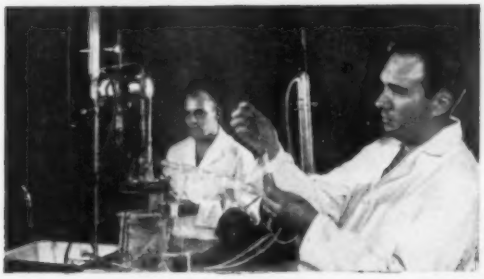
Diamonds Mean, "Less cost per foot."

CHRISTENSEN DIAMOND PRODUCTS

1937 SOUTH SECOND WEST • SALT LAKE CITY, UTAH


think
Tube-Kote ®

Tube-Kote coatings also are used to prevent paraffin accumulation and to protect tanks and vessels from all types of corrosive deterioration.



Tube-Kote research is available to you in solving your specific corrosion problems . . . to increase your company profits by decreasing operating costs.

SUPERIOR COATINGS TO STOP CORROSION

The acceptance of plastic coatings to protect oil field tubular goods from corrosion is widespread in the oil industry. Likewise, Tube-Kote is accepted as the pioneer of every major improvement in plastic coatings since 1939. Through research, Tube-Kote has developed many coatings . . . each with special properties needed to solve unique corrosion problems . . . each developed to rigid specifications before marketing. Think Tube-Kote when you need pipe coatings.

TUBE-KOTE®

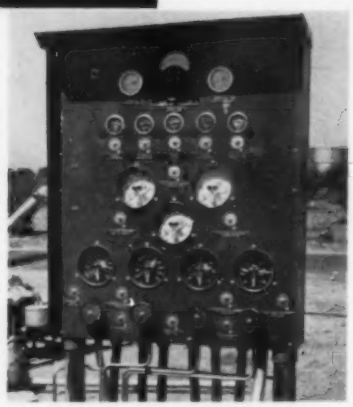
P. O. BOX 20037 • HOUSTON 25, TEXAS BRANCH PLANT • HARVEY, LOUISIANA

EXPORT REPRESENTATIVES: LUCEY EXPORT CORP. 223 BROADWAY NEW YORK 7, N.Y.

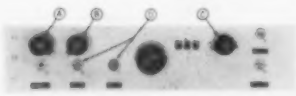
Tube-Kote research and superior methods bring you more durable coatings and faster service . . . at lower cost!

MURPHY

MODULAR PANELS CENTRALIZE ENGINE, OR MOTOR AND COMPRESSOR SAFETY AND CONTROL!

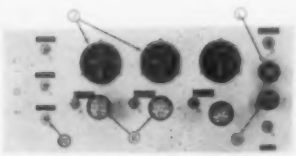


A Fillmore, California Installation



ENGINE CONTROL PANEL

Murphy Engine Safety Switches provide visible indication as well as positive shutdown in the event of trouble. A typical panel is equipped with (A) water temperature (SR-21), (B) oil pressure (0-75), (C) overspeed and overload (V-230), safety switches. In addition, individual Murphy "Tattletale" Switches (D) are installed to give indication of the cause of shutdown.



COMPRESSOR CONTROL PANEL

Complete compressor protection is afforded each function of your valuable equipment by this modular panel consisting of the following standard Murphy safety switches: (J) OPL-F Hi-Lo Pressure Switches complete with (K) pulsation dampeners for suction, interstage and discharge pressures; (L) one compressor water jacket temperature (SR-21), (M) one compressor oil pressure (0-75), (N) one compressor oil level (L-100-W), and individual "Tattletale" Switches to show cause of shutdown. Saves valuable time in trouble-shooting.

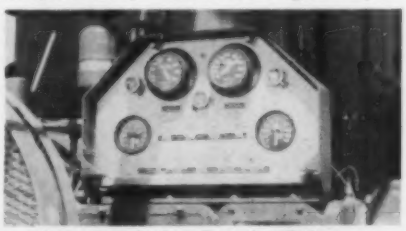
COMPRESSOR TEMPERATURE CONTROL PANEL

These Murphy SPL Hi-Lo Temperature Safety Switches (W) will provide your compressor with precise temperature indication and protection throughout the system. Compressor operating conditions are most readily indicated by line temperatures and Murphy SPL units protect against excessive temperatures. Stainless steel seperable sockets permit easy installation.

Murphy "Tattletale" Switches pinpoint trouble automatically. SPL switches are available in these standard ranges: 100°-350°F, 260°-450°F, 30°-300°F. Other ranges on request.

Only Murphy Safety Switch offers complete compressor instrumentation providing indicating gauges with positive shutdown protection in standard or semi-standard panels with prices that S-T-R-E-T-C-H your equipment dollar.

Engine or electric-motor powered, your compressor can be Murphy-equipped through local dealer stocks of standard components or contact our Engineering Department for complete details.



A Rio Grande City, Texas Installation

IN THE FAR WEST
11812 DAVENPORT ROAD
LOS ALAMITOS, CALIF.

FRANK W. MURPHY *Manufacturer, Inc.*
RANCH ACRES STATION TULSA, OKLAHOMA

course on oil and gas law, Southwestern Legal Center, Dallas.

9-11 American Association of Petroleum Geologists, Rocky Mountain section, ninth annual meeting, Civic Auditorium, Albuquerque, N. M.

11-13 Southwestern Legal Foundation, tenth annual institute on the law of oil, gas, and taxation, Southwestern Legal Center, Dallas.

15-19 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Sir Francis Drake Hotel, San Francisco.

16-19 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, forty-fourth annual meeting, Memorial Auditorium, Dallas.

24-25 University of Oklahoma, sixth geological symposium, Norman, Okla.

27 Natural Gasoline Association of America, Permian basin regional meeting, Scharbauer Hotel, Midland, Tex.

MARCH

9-11 Midwest Gas Association, annual meeting, Hotel Fort Des Moines, Des Moines.

16-18 Western Petroleum Refiners Association, forty-seventh annual meeting, Hilton Hotel, San Antonio, Tex.

19-20 New England Gas Association, annual meeting, Hotel Statler, Boston.

25-27 American Petroleum Institute, Division of Production, southern district meeting, Roosevelt Hotel, New Orleans.

APRIL

2-3 Society of Petroleum Engineers of AIME, Rocky Mountain petroleum section, Casper, Wyo.

2-3 American Institute of Mining, Metallurgical, and Petroleum Engineers, technical conference on stress corrosion, Mellon Institute, Pittsburgh.

5-10 American Society of Mechanical Engineers, nuclear congress, Cleveland Auditorium, Cleveland.

8-10 American Petroleum Institute, Division of Production, eastern district meeting, Penn-Sheraton Hotel, Pittsburgh.

14 Independent Oil Men's Association of New England, annual meeting, Hotel Statler, Boston.

14-16 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

15-17 National Petroleum Association, semiannual meeting, Hotel Cleveland, Cleveland.

15-17 American Petroleum Institute, Division of Transportation, annual tanker conference, Jung Hotel, New Orleans.

19-23 American Society of Mechanical Engineers, oil and gas power conference and exhibit, Shamrock-Hilton Hotel, Houston.

22-24 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Herring Hotel, Amarillo, Tex.

22-24 Natural Gasoline Association of America, thirty-eighth annual convention, Baker and Adolphus Hotels, Dallas.

26-28 Texas Independent Producers and Royalty Owners Association, membership meeting, Baker Hotel, Dallas.

30-May 1 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

A clad "sandwich" being assembled prior to hot rolling. Claymont Stainless-Clad Plates—5 to 50% stainless inseparably bonded to carbon steel backing—offer the corrosion and abrasion protection of stainless steel plus the economy of carbon steel. This is another of the many steel plate products available from Claymont's integrated mill.

by d'Arazien

CLAYMONT
STAINLESS-CLAD PLATES

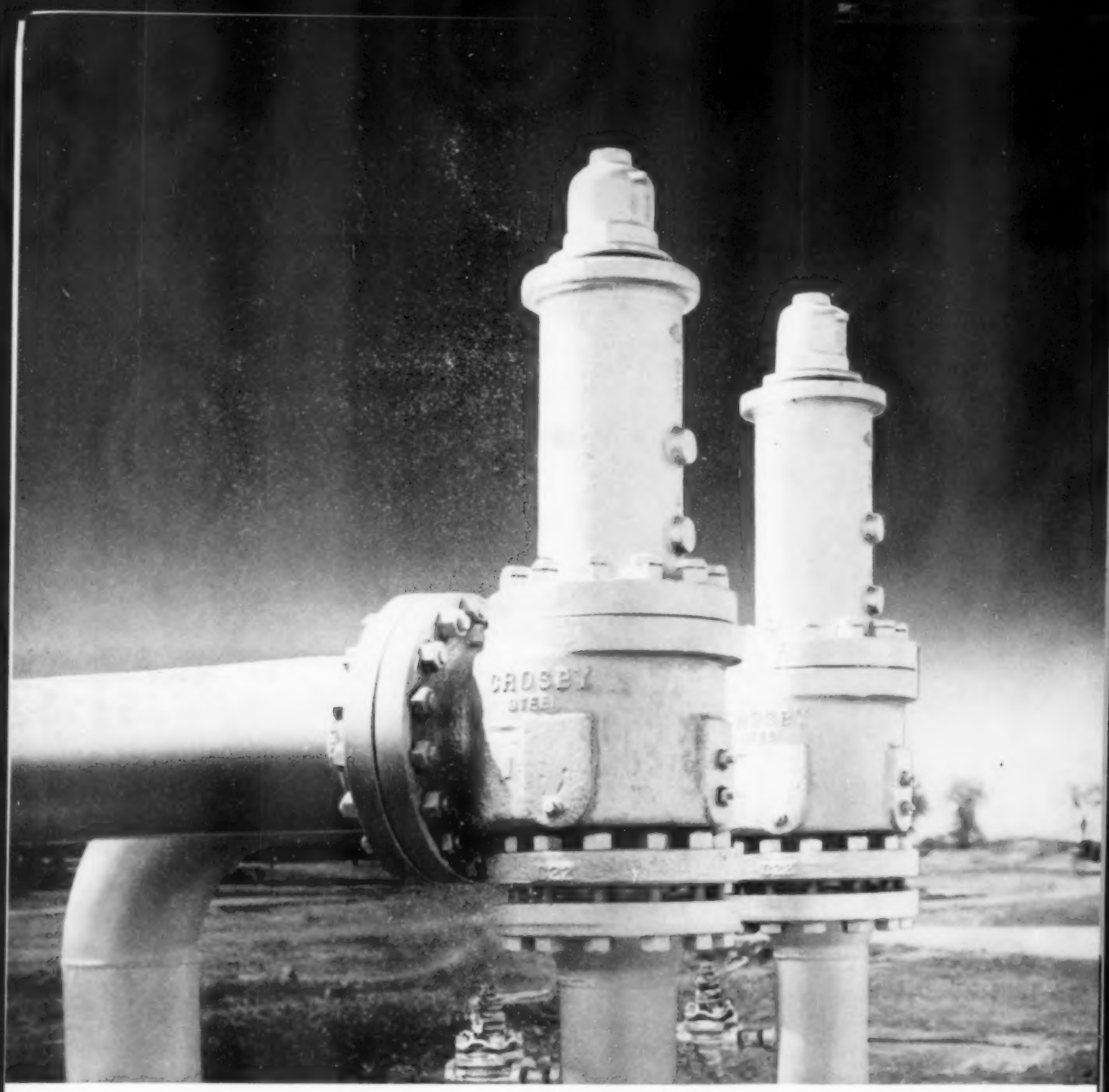
CF&I

CHECK CLAYMONT FOR—Alloy Steel Plates • Carbon Steel Plates • Stainless-Clad Steel Plates High Strength Low Alloy Steel Plates • CF&I Lectro-Clad Nickel Plated Steel Plates • Pressed and Spun Steel Heads • Manhole Fittings and Covers • Fabricated Steel Products Large Diameter Welded Steel Pipe

PRODUCTS OF WICKWIRE SPENCER STEEL DIVISION • THE COLORADO FUEL AND IRON CORPORATION

Plant at Claymont, Delaware • Sales Offices in all Key Cities

5788



Crosby Safety-Relief Valves at main line crude oil pumping station,
West Texas Gulf Pipe Line Company, Ranger, Texas.

Where there's no compromise with safety...

you need the absolute reliability of

Crosby Safety-Relief Valves

CROSBY VALVE AND GAGE CO., Wrentham, Massachusetts

Crosby

KEEPS PRESSURE ON THE SAFE SIDE

The OIL AND GAS JOURNAL

TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 South Cheyenne Avenue, Tulsa, Okla. Phone LUther 4-4411. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

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Phone Altrincham 3160
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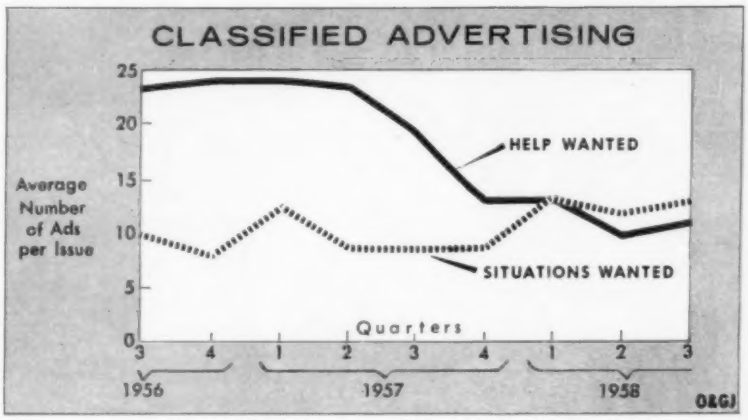
JOURNALLY SPEAKING



Recession Index

HOW BAD was the recession? Is it really over?

Those are questions that all the economists in the country are discussing. And each one has his own pet statistical indicator or index.

You can find analyses and prognostications based on such statistics as gross national product, department-store sales, freight-car loadings, steel-ingot production, and dozens of other things, some of them seemingly quite fragmentary and esoteric.

For instance, we once heard an economist say that the very best indicator of business conditions is the index of dentists' collections. His theory was that in good times almost everybody had his teeth fixed up, and his family's too, and was reasonably prompt in paying the dentist. But in hard times many people let their teeth go and when they do have to have emergency dental work they are very slow about paying the bills.

Now there's a statistical datum for an economist to sink his teeth into and determine whether or not it contains too many cavities (pun) to be a true indicator of prosperity and depression.

In the meanwhile we offer our own indicator of business conditions in the oil industry. It's the chart at the top of this page, and it plots the number of "Help Wanted" and "Situations Wanted" insertions in the classified advertising section of The Oil and Gas Journal during the past 2 years.

This chart shows the number of ads per issue averaged by quarters. At first we plotted them by weeks, but both lines zigzagged up and down so much that it was difficult to spot the trends. You appreciate, of course, that an economist has to be very careful about selecting the right series of figures to make his charts prove his point.

We also tabulated the ads by inches, but quickly detected an economic fallacy in that approach. A couple of years ago when everybody thought there was a shortage of help, particularly engineers, the big-rich companies could buy lots of space for big-type help-wanted ads, whereas the poor so-and-sos looking for jobs can only afford to buy about ½ in. We economists have to consider the human element and sociological factors, you know.

Well, now that we have our index perfected, what does it prove? It proves that the oil business isn't out of the woods yet. As you can see at a glance, more people are looking for jobs than ever before. And fewer jobs are being offered.

Maybe the recession is over for some people, but not for unemployed geologists and petroleum engineers. In view of this sad fact, it might be well for the entire industry to watch our classified-advertising section closely every week to follow the trend of this index.

As a matter of fact, it's a good idea to read that section every week anyway, because it contains a lot of other mighty useful information.

—Henry D. Ralph

WARREN SERVICE

IS SOMETHING YOU CAN CROW ABOUT...

WARREN RESOURCES of Production, Transportation and Storage plus **WARREN'S EXPERIENCE** as a Specialist in its field form a Complete and Dependable **ABILITY** team . . . That is why the Light Hydrocarbons Industry naturally looks to **WARREN**

for dependable deliveries of

NATURAL GASOLINE

(whatever the grade, whatever the volume)

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For Canadian oil and gas: controls before markets?

CITIZENS of one country have neither the knowledge nor the privilege to comment on the domestic political affairs of another nation as freely as they criticize their own government.

Nevertheless, American oil men cannot suppress a feeling of concern over the first report of the Royal (Borden) Commission on Energy which has been making an extensive study of the oil and gas industry of Canada.

The report recommends an astonishing degree of federal control of almost all operations of the industry—a trend which the United States industry has been fearing and fighting for a generation.

IF PARLIAMENT SHOULD ENACT the proposals, a National Energy Board would be created and the Board of Transport Commissioners would have greatly enlarged powers. These federal agencies would license imports, exports, and interprovincial movements of oil and gas; regulate production, processing, distribution, use, and conservation; and keep a check on prices, transportation charges, and profits in the industry.

Gas commitments would stand for a longer period, but all other contracts apparently would be subject to federal review and revision every year or two. It is difficult to see how any industry could plan and build under such conditions.

From our side of the border it is hard to believe that Canadians would even consider such a strait jacket for the vigorous young industry that has given them an overabundance of reserves in just one decade. The inference is that consumer and political interests have even greater misunderstandings of the petroleum industry than do their counterparts in the United States.

The plan is more restrictive and sweeping than any proposal for regulating the oil and gas industry that has been seriously considered in the United States—so far. And it comes from a country which Americans had considered a greater champion of free enterprise than themselves, one more hostile to federal encroachment on local authority than the most ardent states-righters here.

SPECIFIC SUGGESTIONS for helping the Canadian industry market its surpluses are few in this first Borden report. The whole subject of oil is postponed to some later date.

As to gas, it says that surpluses beyond domestic needs may be exported. But it calls for further studies to determine how much may be spared, and for federal supervision of prices, contract terms, physical plans, and financing arrangements.

From where we sit it would seem that producers in the Prairie Provinces can take little comfort in the knowledge that Ottawa is going to make sure that everybody else's interest is protected before they can begin to hunt a market for their huge shut-in reserves of oil and gas.

Now is the time to DODGE

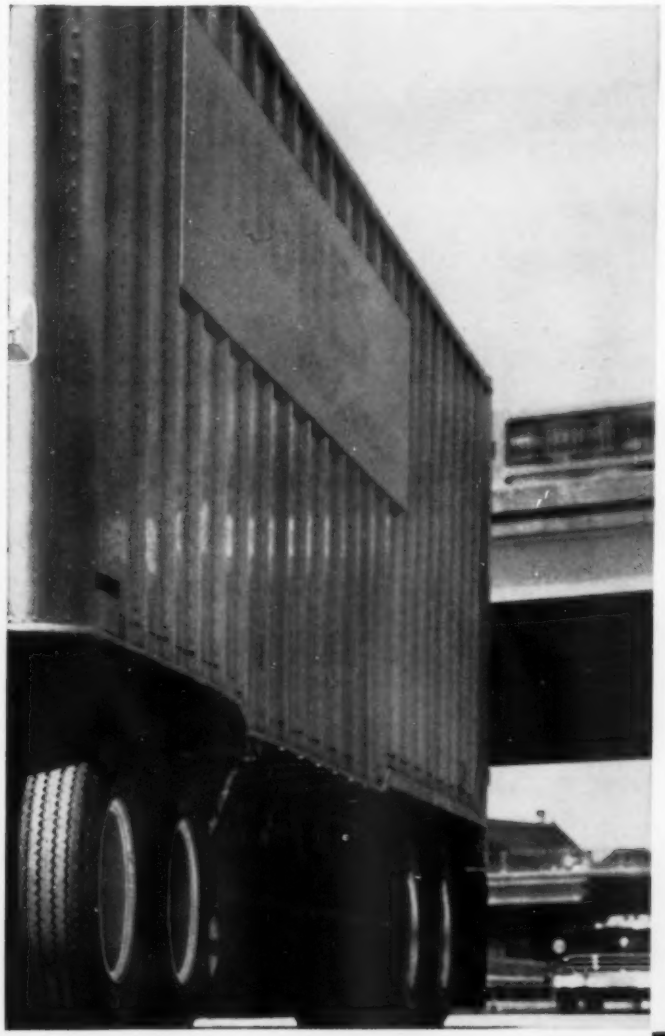
New '59 Dodge Power Giants, "Job-Rated" for

CONVENTIONAL Models 400, 500, 600, 700, 800, 900—G.V.W.'s to 30,000 lbs.; G.C.W.'s to 65,000 lbs.

TANDEM Models T700, T800, T900—G.V.W.'s to 49,000 lbs.; G.C.W.'s to 65,000 lbs.

C.O.E. Models C500, C600, C700—G.V.W.'s to 25,000 lbs.; G.C.W.'s to 50,000 lbs.

drive the new 1959 *Power Giant*



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WHERE THEY COUNT!
New performance!
New comfort!

Look into the cab—look into the chassis! Wherever you look in the new 1959 Dodge trucks, you'll find changes that *mean something*. New convenience, for instance, in suspended brake and clutch pedals, and hydraulically operated clutch. New heavy-duty electrical system. Greater dependability. Increased G.V.W.'s on tandems. Concealed running boards on medium-tonnage models.

You'll find new cab comfort, too, and better heaters. Plus new instrument panels designed especially for medium- and high-tonnage requirements.

Ask your dealer about all the new Power Giant advancements. And about the new network of Dodge Truck Centers that let him give quick delivery of any Dodge truck to meet your exact needs. Plus hurry-up parts service. See him soon!

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Striking new Dodge low-tonnage models! This spirited new Sweptline Pick-up leads a complete line of new 1959 Dodge low-tonnage trucks. Advanced models for every need, from 5,100 to 10,000 lbs. maximum G.V.W.

every trucking need

4-WHEEL-DRIVE Models W100, W200, W300, W300M, W500—G.V.W.'s to 20,000 lbs.

FORWARD-CONTROL Models P300 and P400 G.V.W.'s to 15,000 lbs.

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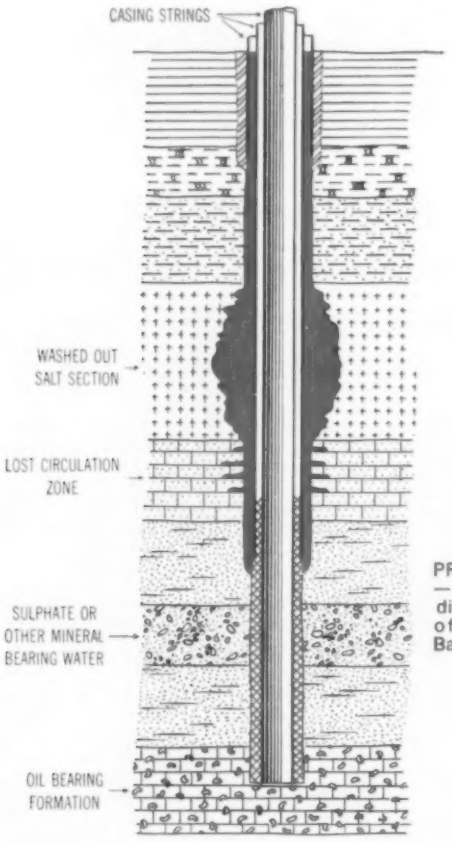
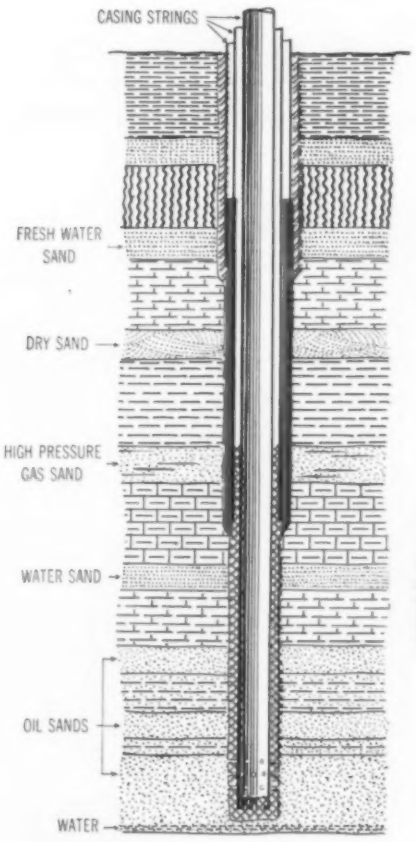
PROTECTION ...where Protection is Needed



PROTECTION — under conditions typical of Permian Basin area.



PROTECTION— under conditions typical of East Texas and the Gulf Coast.

• Dependable oil-well protection is of prime importance to assure successful well completion and continued long-term, low-cost operation. This requires an oil well cement that has all the necessary built-in protective qualities. This means the selection of the right cement for each job—based on well depth, type of completion, pressure, temperature, slurry weight and volume, and adequate protection against sulphate or other mineral-bearing waters.

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'STARCOR'* Slow-Setting Oil Well Cement

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OIL MEN from all over the country will crowd into Chicago hotels as . . .

API Opens Annual Meeting Today

• Economic trend takes spotlight at nation's top oil convention this week. Varied program features talks on costs, demand, conservation, technology, and public relations by leaders in industry, government, education.

NEARLY every major problem facing the oil industry will be threshed out at the thirty-eighth annual API meeting starting today and continuing through Wednesday in Chicago.

The first of the expected 6,500 delegates began arriving last week to take part in scores of technical committee meetings under way since Thursday in the Conrad Hilton, Palmer House, and Congress hotels.

But the big attractions start today when the first general and group sessions are called to order (see program on page 86).

Main speakers at Monday's opening general session will be Frank M. Porter, API president, and George Romney, president of American Motors Corp., Detroit.

Wednesday's general session will feature talks by Morgan J. Davis, president of Humble Oil & Refining Co., Houston; Lee A. DuBridge, president of California Institute of Technology, Pasadena; and E. V. Murphree, president of Esso Research & Engineering Co., Linden, N. J.

Other speakers . . . Top-notch speakers at group sessions include Charles E. Wilson, former secretary of defense and former president of General Motors Corp.

The division of production will hear addresses by L. F. McCollum, president of Continental Oil Co., Houston; Thomas C. Mann, assistant secretary of state; and Charlton H. Lyons, Sr., of Lyons & Logan, Shreveport. Lyons will discuss conservation.

Cost of finding and producing gas under FPC regulations is the subject of S. P. Porter of Arthur Young & Co.; Robert G. Dunlop, president of Sun Oil Co., will talk on "Oil's Challenge to the Economist."

Petroleum forecast and growth in world demand is the topic of Austin Cadle, manager of the economics department of Standard Oil Co. of California, San Francisco. Milton Friedman, professor of economics, University of Chicago, will speak on inflation.

Next Week

A special news report of the API meeting will appear in the next issue of the Journal. The special report will be a comprehensive and interpretative account of what oil men did, decided, and said at the world's biggest oil meeting.

API Officers

H. S. M. Burns
API chairman and president of Shell Oil Co.

Frank M. Porter
API president

Charles E. Spahr
Vice president for transportation

The API Staff

W. H. Strang
Production

John H. Bivins
Public Affairs

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Marketing

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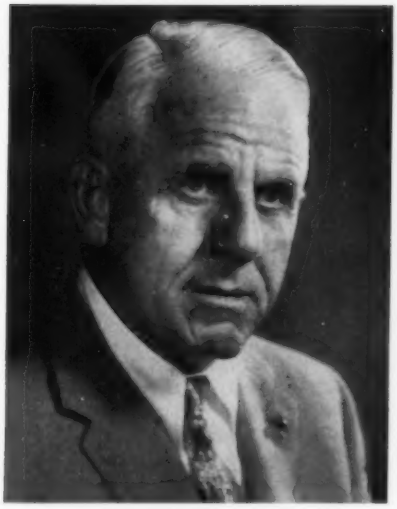
Refining



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H. W. Ferguson
Vice president for refining

Dwight T. Colley
Vice president for marketing

A. A. Buzzi
Vice president, finance and accounting

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Fred Van Covern
Statistics

James E. Moss
Transportation

R. H. Steward
Finance and accounting

API Certificates of Appreciation Go to

• Leaders in various fields are recognized for long and valuable service to API and the oil industry.

OUTSTANDING oil men from 15 states and the District of Columbia are being honored at the API meeting in Chicago this week for exceptional service to the industry.

Twenty-four of the recipients are cited for their contribution to the Oil Information Committee and the American Petroleum Industries Committee, recently consolidated into a new Committee on Public Affairs.

Another 24 certificates are being presented by the divisions of transportation, production, marketing, and finance and accounting. Four men were cited for their work in research and medicine.

In addition to the 52 certificates of appreciation, which will be presented at the various group sessions and committee meetings, two special awards will be made to Jake L. Hamon, Dallas independent, and W. S. S. Rodgers, former president and retired chairman of The Texas Co.

Rodgers will receive the Gold Medal for Distinguished Achievement at the opening general session. Hamon will receive the Carl A. Young Memorial Award at the group session of the division of production (OGJ, Nov. 3, p. 51). This is the first year the Young Award has been presented.

Recipients of the certificates of appreciation are as follows:

Production Division

R. B. Anderson, Columbia Carbon Co., Charleston, W. Va.; Milan G. Arthur, Union Oil Co. of California, Los Angeles; H. F. Beardmore, Warren Petroleum Corp., Houston; S. E. Buckley, Humble Oil & Refining Co., Houston; J. O. Hills, General Petroleum Corp., Los Angeles.

H. S. Kelly, Phillips Petroleum Co., Bartlesville, Okla.; George B. Kitchel, Kerr-McGee Oil Industries, Inc., Houston; H. W. Perkins, Sun Oil Co., Beaumont, Tex.; and F. H. Willibrand, Sohio Petroleum Co., Oklahoma City.

Transportation Division

William G. Anderson, Atlantic Refining Co., Philadelphia; A. D. Carleton, Standard Oil Co. of California, San Francisco; R. L. Carruthers (retired), Shell Pipe Line Co., Houston; M. S. Collett, Atlantic Refining, Philadelphia; Fred Hague, Sun, Philadelphia; E. L. Hoffman, Socony Mobil Oil Co., New York.

E. W. Jacobsen, Gulf Research & Development Co., Pittsburgh; A. E. Kihn, California Shipping Co., San Francisco; Frank O. Prior, Standard Oil Co. (Ind.), Chicago; R. G. Strong (retired), Natural Gas Pipeline Co. of America, Chicago; and C. H. Wager, Shell Oil Co., New York.

Oil Information Committee

W. A. Alexander, Shell, Denver; W. A. Bourne, Gulf Oil Corp., Toledo, Ohio; Charles R. Brown, Tidewater Oil Co., San Francisco; Fayette B. Dow, National Petroleum Association, Washington, D. C.; Richard D. Drysdale, Sun Oil, Boston; W. M. Johnson, Shell, New Orleans; R. C. W. Jones, Du Pont, New York; Harry J. Kennedy, Continental Oil Co., Houston.

W. G. King, Jr., Richfield Oil Corp., Los Angeles; Thomas W. Phelps, Socony Mobil, New York; H. J. Potts, Socony Mobil, Philadelphia; Harold E. Purdy, Indiana Standard, Kansas City, Mo.; J. O. Sanders, The Texas Co., Atlanta, Ga.; J. L. Sewell, Delhi-Taylor Oil Corp., Dallas; and Charles E. Simons, Texas

Highlights of API Program . . .

General Sessions
(Grand ballroom, Conrad Hilton)

Monday, 2 p.m.

Remarks by Frank M. Porter, API president.

Address by George Romney, president, American Motors Corp.

Wednesday, 10 a.m.

Election of API directors.

Address by Morgan J. Davis, president, Humble Oil & Refining Co.

"Fifth World Petroleum Congress" by E. V. Murphree, president of Esso Research & Engineering Co., and president of the petroleum congress.

Address by Lee A. DuBridge, president, California Institute of Technology.

Division of Production
(Grand ballroom, Conrad Hilton)

Tuesday, 1:45 p. m.

Address by L. F. McCollum, president, Continental Oil Co.

"Why Conservation" by Charlton H. Lyons, Sr., of Lyons & Logan, Shreveport.

Address by Thomas C. Mann, assistant secretary of state.

Division of Finance and Accounting
(Waldorf room, Conrad Hilton)

Monday, 10 a.m.

"Determining the Cost of Finding and Producing Gas Under FPC Regulations" by S. P. Porter of Arthur Young & Co., Tulsa.

Tuesday, 10 a.m.

"What Price Inflation?" by Milton Friedman, professor of economics, University of Chicago.

Committee on Petroleum Statistics
(Waldorf room, Conrad Hilton)

Tuesday, 10 a.m.

"The Economic Outlook for 1959 and Its Impact on Automobile Sales" by R. J. Eggert, marketing research manager, Ford Motor Co.

"U. S. Petroleum Forecast and Dynamic World Growth in Petroleum Demands" by Austin Cadle, manager of economics department, Standard Oil Co. of California.

"Oil's Challenge to the Economist" by Robert G. Dunlop, president, Sun Oil Co.

Petroleum-Industry Buyers
(Boulevard room, Conrad Hilton)

Tuesday, 2 p.m.

"Tangible and Intangible Values" by Charles E. Wilson, former secretary of defense and former president of General Motors Corp.

"The Biggest Management Job Ahead" by Lemuel R. Boulware, vice president of General Electric Co.

Division of Refining
(Grand ballroom, Conrad Hilton)

Tuesday, 10 a.m.

"Refining Flexibility and the Problems of Seasonal Demand" by H. W. Ferguson, vice president of Humble Oil & Refining Co.

Committee on Public Affairs
(Grand ballroom, Conrad Hilton)

Monday, 11 a.m.

"The Oil Industry as Viewed by

52 Oil Men

Mid-Continent Oil and Gas Association, Dallas.

American Petroleum Industries Committee

Oscar John Dorwin, Texaco, New York; Rayburn L. Foster, Phillips, Bartlesville; Archie D. Gray, Gulf, Pittsburgh; Charles Z. Hardwick, Ohio Oil Co., Findlay; J. G. Jordan, Shell, New York; William A. McAfee, Standard Oil Co. (Ohio), Cleveland; R. L. Milligan, Pure Oil Co., Chicago; Henry L. O'Brien, Cities Service Co., New York; and Merrill H. Utley, Standard Oil Co. (Ky.), Louisville.

Marketing Division

P. W. Engels, Shell, New York; Samuel Rosenwasser, S. R. Service Stations, Brooklyn; and Nelson H. Seubert, Jersey Standard, New York.

Fundamental Research

Lloyd E. Elkins, Pan American Petroleum Corp., Tulsa; Theodore W. Nelson, Socony Mobil, New York; and W. D. Seyfried, Humble, Baytown, Tex.

Medical Advisory Committee

Dr. Robert B. Echardt, Esso Research & Engineering Co., Linden.

Finance and Accounting

Ralph A. Martin, Ohio Standard, Cleveland.

Two of the Nation's Top Editors" by Lyle C. Wilson, vice president and Washington manager of United Press International, and Louis B. Seltzer, editor of The Cleveland Press.

Division of Marketing
(Congress Hotel)

Tuesday, 12 noon

Oil marketers "get-together" luncheon in the Michigan room and Glass Hat.

Tuesday, 2 p.m.

Open business session in the Gold room.

Division of Transportation
(Red Lacquer room, Palmer House)

Monday, 10 p.m.

"Modern Transport and Archaic Controls" by John S. Burchmore, general counsel for National Industrial Traffic League, Chicago.

"How Vehicles Stretch Our Reach in Geophysics" by Athelstan F. Spilhaus, dean of the University of Minnesota's Institute of Technology.

watching WASHINGTON

Bertram F. Linz

• Price fixing treated as criminal case

A POLICY of treating price-fixing cases as criminal violations is now being followed by the Justice Department. That is the rule applied in the case against major companies operating east of the Rocky Mountains. The case recently was transferred to Tulsa from Alexandria, Va.

The department's plan for cases of this nature was explained by Asst. Atty. Gen. Victor R. Hansen, head of the antitrust division.

Prosecutions will start with grand-jury investigations. Indictment of individuals will be sought where they are found to be the moving force or leader of a conspiracy to fix prices. But they will not be indicted where it appears that they merely carried out orders as an employe. In both instances, however, the corporation will be named.

Criminal cases are not brought in an effort to get a civil consent decree to stop price fixing. After an indictment has been returned, if a civil suit also is filed it will be held up while the criminal action is pending.

The department will not accept nolo (no defense) pleas and will oppose them if offered in court.

• Tidelands agreement may be near

THE PLANNED OFFERING of new oil and gas leases on the outer Continental Shelf is seen as a sign that the Interior and Defense departments are near agreement on their respective rights in the Gulf of Mexico.

Over the past few years the military has sought to take over vast areas in the gulf for missile testing and other purposes. No oil development or other operations are permitted in these areas because of the dangers raised by military operations.

Disclosure of plans to seek air-space reservations over some 19-million acres of potentially valuable oil deposits off Texas and Louisiana brought strong protests from Interior last year.

A House committee studying military withdrawals of onshore lands extended its probe to the gulf at the urging of Interior officials. The result was a law requiring the Defense Department to get congressional approval for the taking of areas in excess of 5,000 acres.

Since then the departments have been working on an agreement under which the military will keep out of the gulf oil areas.

• Ike may seek more oil taxes

TEN CENTS OUT OF EVERY DOLLAR the Government spends goes to pay interest on the national debt.

The Government borrows money in a big way. So it gets wholesale rates, so to speak. But even so, the cost of its debt is just about $8 billion a year. That is 10% of the $80 billion which will be spent this year.

The national debt is now above the $280-billion mark. It may be $6 billion or more higher by next June 30 and another $6 billion higher by the same date in 1960.

With an $80-billion budget now being written for the 1960 fiscal year, the administration is looking for new sources of revenue. But these are sought more to offset any new spending ideas Congress may think of than to balance the budget.

Some of the things President Eisenhower may urge upon Congress in January to this end already are known:

A 2-cent hike in the federal gasoline tax and an increase in the aviation-gas tax. The former would help keep the highway trust fund in the black. The latter would pay for some of the federal aids to aviation.

ANETH OPERATORS give their views on federal shutdown at Washington hearing.

Proration of Aneth's Oil Proposed

• Operators suggest limiting oil production as a means of controlling gas flaring. But government officials indicate they'll insist on shutting in Utah's producing areas until a pipeline is finished to take the gas.

THE Interior Department is taking a firm stand on gas waste.

Late last week the department was preparing an announcement that it would neither postpone nor modify its order shutting in the Aneth area of Utah.

Its reasoning: Any change in the order would permit further waste of gas and, too, sale of gas from the field will depend on Federal Power Commission approval of the price to be paid by the pipeline.

The order could result in proration of crude-oil production in the area.

Several major operators in the field are in favor of per-well allowable of crude to reduce the waste of gas. This and other ideas for meeting the situation which led to the issuance of an Interior Department order closing the field this week were laid on the table at a hearing before Under Secretary Elmer Bennett.

The Government's shutdown order covers 327 of the area's 357 producible wells (OGJ, Oct. 20, p. 49).

A per-well allowable of 150 bbl. per day for 2 or 3 months to reduce immediate waste of gas and to permit state officials to work out a continuing plan for enforced conservation was proposed by Phillips Petroleum Co.

The plan was endorsed, with variations, by several other major companies operating in the area.

But Phillips does not want to join a voluntary program to prevent gas waste, Jack Tarner, a company engineer, emphasized. Production controls, he contended, should be ordered either by the U. S. Geological Survey or the Utah Oil and Gas Commission.

Postponement of the shutdown until December 15 was urged by The Texas Co. and Three States Natural Gas Co. A Texaco spokesman pointed out that the delay in obtaining a pipeline connection for Aneth gas resulted from a dispute over the price for the gas rather than by any fault on the part of the producers. This issue is pending before the Federal Power Commission.

What companies said . . . Operators termed the shutdown a "drastic" measure. Several, however, indicated they felt some step should be taken to reduce gas waste.

"We have been concerned for some time over the flaring of gas in the Aneth field," said J. L. Seger, executive vice president of Carter Oil Co. He favored some type of continuing production controls but objected to the Phillips proposal to reduce oil output while permitting continued waste of gas.

Seger expressed the fear that a complete shutdown of the field might cut off present markets for Aneth crude, thereby penalizing producers who have spent large sums in lease bonuses and development drilling.

Herbert Varner, representing Superior Oil Co., said emphatically: "Waste is going on and we think it should be stopped."

He urged production controls to protect correlative rights of the producers and to prevent drainage of reserves by competitors.

Shell Oil Co. went on record in favor of the Phillips plan provided companies would be allowed to increase their production as they found "beneficial use" for the gas.

More than $19 million has been invested in a pipeline project to handle Aneth gas, George D. Horning, Jr., of El Paso Natural Gas Co., said.

El Paso expects to be ready to take about 35,000,000 or 40,000,000 cu. ft. of gas per day from Aneth by November 10. Facilities are scheduled to be completed by mid-December virtually to double the initial take.

Estimates of the U. S. Geological Survey place wasted gas from federal-controlled portions of Aneth

field at 64,000,000 cu. ft. per day. The Phillips plan would limit crude production to about 50,000 bbl. per day and permit the flaring of no more than 35 million cubic feet of gas per day while El Paso is awaiting an FPC certificate to start buying gas.

Utah's view . . . E. W. Clyde of the Utah Oil and Gas Commission scoffed at reports of a conflict between the state and federal governments in controlling production on Indian lands.

The Utah official charged that gas is being flared at Red Wash, where the U. S. Government also is a landlord. The gas-oil ratio there is 20 times worse than at Aneth, he said, but the Interior Department has not seen fit to curtail production there.

Navajos speak . . . A spokesman for the Navajos, whose plea to the Interior Department prompted the shutdown order, indicated the Indians may want a voice in determining what agency should assume the task of governing Aneth production in the future.

Norman Littell, an attorney for the Navajo Tribal Council, said the Indians had never acknowledged the state's right to prorate production on Indian lands. However, he added, the council was not challenging it at the moment.

Less Friendly Congress in the Offing

- Nineteen senators who supported depletion will be missing when Congress convenes in January; only four opponents lost out in the elections. Prospect is for a "liberal" Congress friendly to labor and small business.

THE THINNING RANKS of members who have supported the oil industry in past years will be further depleted in the next Congress.

And the big gains scored by Democrats in last week's elections may spell increased trouble for the industry.

The almost top-heavy Democratic membership in both House and Senate is seen as leading to two things:

. . . A spending spree by Congress with President Eisenhower vetoing many appropriations.

. . . A still more "liberal" approach than in the past to legislation affecting business and industry.

Effect of the elections can be indicated by two examples.

In the Senate . . . Six of the 33 senators whose terms expire this year did not run for reelection. All of them had voted last August against the Williams plan to cut the depletion allowance. But another 13 who also voted against the cut were defeated.

On the other hand only four of the eleven candidates who voted for the cut, and one of three who did not vote failed of reelection.

In the House . . . On the other side of the capitol, three of the four top ranking Republican members of the House Commerce Committee retired and the other (Hale of Maine) was defeated last September.

Last week, two other Republican members were washed out. But only one Democratic member was lost (Dies of Texas), by a redistricting of the state which wiped out his job.

The commerce committee, along with all others, will be revamped in line with the increased Democratic majority. There will be more Democrats, fewer Republicans.

Organized labor flexed its muscles and beat down right-to-work legislation in five of the six states in which it was up for vote—California, Ohio, Colorado, Idaho and Washington. The ban on the closed union shop won in only one state, Kansas, raising to 19 the total of states having the law.

Labor also claims to have played a leading role in the defeat of Sen. Knowland as governor of California, the reelection of Gov. Williams in Michigan and the licking of Sen. Potter of the same state.

But labor itself took a beating in Arizona, where Sen. Goldwater won reelection with union corruption as his chief issue.

With so many new members in their ranks, congressional committees will run many investigations next year to acquaint the recruits with the problems they must deal with.

But actual enactment of any really important measures affecting the industry is seen as delayed until 1960, when they can provide ammunition for the presidential campaign.

How many anti-industry measures become law will depend on the strength of the conservative bloc—and on vetoes by the president.

What to expect . . . Here are some of the oil measures that are expected to be pressed:

A cut in the depletion rate will probably get better than the 26 to 63 votes recorded last August, but not enough to put it over for another two or three years.

Natural-gas legislation calling for more than relief for the small producers appears to have little chance of passage.

Practices of the oil pipelines are in for a thorough going-over.

Pre-merger notification is seen as having a much better chance of passage than in the past.

Divorce of marketing from other branches of the industry will get increased support.

Fair-trade legislation and tightening of the Robinson-Patman anti-price discrimination act could pass before the end of the Congress.

Present corporation tax rates will probably be continued for at least another year. Expectation of a deficit is one factor, heavy spending above the next budget would be another.

The gasoline tax may be hiked to keep the highway trust fund solvent. The avgas levy may be raised to provide money for the federal airway system.

The Interior Department's plan for a quarter-billion dollar helium conservation program stands a good chance of acceptance.

The Navy is more confident of getting a naval petroleum reserve on San Nicolas and adjoining islands off the California coast. It also will get good support for its plan to revive oil-shale research on a contract basis. But the chances are not bettered for the move to give shale oil a 27½ per cent depletion allowance.

The demand for import controls on residual fuel oil will be stronger as a result of the election of two new senators from West Virginia.

A research program on production of motor fuel and butadiene from surplus grain is likely to pop up again.

What actually happens on these and other bills that will be brought up will depend on two things—the ability of the industry to present its case convincingly and the vigor with which congressional leaders and the administration oppose unsound measures.

Here's How Detroit Is Changing

Make and Model	Engine Type	Carburetor	Compression Ratios 1959	Compression Ratios 1958	Compression Ratios Change	Horsepower 1959	Horsepower 1958	Horsepower Change
Buick								
Le Sabre	V-8	2 bbl.	10.5	9.5	+1.0	250	250	....
Invicta	V-8	4 bbl.	10.5	10.0	+0.5	325	300	+ 25
Electra	V-8	4 bbl.	10.5	10.0	+0.5	325	300	+ 25
Cadillac*								
	V-8	4 bbl.	10.5	10.0	+0.5	325	310	+ 15
	V-8	3, 2 bbl.	10.5	10.0	+0.5	340	335	+ 5
Chevrolet*								
	6	1 bbl.	8.25	8.25	....	135	145	— 10
	V-8	2 bbl.	8.5	8.5	....	185	185	....
	V-8	4 bbl.	9.5	9.5	....	230	230	....
	V-8	Fuel Inj.	9.5	9.5	....	250	250	....
	V-8	4 bbl.	9.5	9.5	....	250	250	....
	V-8	4 bbl.	11.0	....	....	300	....	....
	V-8	3, 2 bbl.	9.5	9.5	....	280	280	....
	V-8	3, 2 bbl.	11.0	....	....	315	....	....
Continental	V-8	4 bbl.	10.0	10.0	....	350	375	— 25
Chrysler								
Windsor	V-8	2 bbl.	10.1	10.0	+0.1	305	290	+ 15
Saratoga	V-8	4 bbl.	10.1	10.0	+0.1	325	310	+ 15
New Yorker	V-8	4 bbl.	10.0	10.0	....	350	345	+ 5
300 E	V-8	2, 4 bbl.	10.0	10.0	....	380	380	....
De Soto								
Firesweep	V-8	2 bbl.	10.0	10.0	....	290	280	+ 10
Firedome	V-8	4 bbl.	10.1	10.0	+0.1	305	295	+ 10
Fireflite	V-8	4 bbl.	10.1	10.0	+0.1	325	305	+ 20
Adventurer	V-8	2, 4 bbl.	10.1	10.0	+0.1	350	345	+ 5
Dodge								
Coronet	6	1 bbl.	8.0	8.0	....	135	138	— 3
Coronet	V-8	2 bbl.	9.2	9.0	+0.2	255	252	+ 3
Royal	V-8	2 bbl.	10.1	9.0	+1.1	295	265	+ 30
Custom Royal	V-8	4 bbl.	10.1	9.0	+1.1	305	295	+ 10
D-500	V-8	4 bbl.	10.0	10.0	....	320	305	+ 15
Super D-500	V-8	2, 4 bbl.	10.0	10.0	....	345	320	+ 25
Edsel								
Economy 6	6	1 bbl.	8.4	....	....	145	....	....
Corsair	V-8	2 bbl.	8.8	....	....	200	....	....
Express	V-8	2 bbl.	8.9	....	....	225	....	....
Super Express	V-8	4 bbl.	9.6	10.5	—0.9	303	300	+ 3

Detroit Eases Rise in Horsepower and

• The 1959 model cars generally represent a break in engine trends held steadily since World War II. But octane requirements of many new cars still will be higher due to engine changes designed for economy.

FOR OIL MEN, the 1959 model cars present a mixed picture and a few headaches.

The engines which power the sleek jobs range all the way from a new high in compression ratio to a new entry in the low horsepower field.

For example:

Chevrolet is offering the first engine with a 11:1 compression ratio. This power-pack option almost certainly will have limited appeal, but it does move the peak for compression 0.5 above 1958's top of 10.5:1.

Studebaker-Packard is out with a new model, the Lark, which boasts a 90-hp. engine. It pits Studebaker-Packard against American Motors and the imports for the economy-car market.

Compression . . . This year will go down as the time the Big Three went in different directions on compression ratios.

Engines in the 1959 Model Cars

Make and Model	Engine Type	Carburetor	Compression Ratios 1959	Compression Ratios 1958	Compression Ratios Change	Horsepower 1959	Horsepower 1958	Horsepower Change
Ford								
Milage Maker Six	6	1 bbl.	8.4	8.6	−0.2	145	145	....
Custom 300	V-8	2 bbl.	8.8	9.1	−0.3	200	205	− 5
Fairlane	V-8	2 bbl.	8.9	9.5	−0.6	225	240	− 15
Fairlane 500	V-8	4 bbl.	9.6	10.2	−0.6	300	300	....
Lincoln*	V-8	4 bbl.	10.0	10.0	....	350	375	− 25
Mercury*								
	V-8	2 bbl.	8.75	10.5	−1.75	210	312	−102
	V-8	2 bbl.	10.0	10.5	−0.5	280	330	− 50
	V-8	4 bbl.	10.0	10.5	−0.5	322	360	− 38
	V-8	4 bbl.	10.0	10.5	−0.5	345	400	− 55
Oldsmobile*								
	V-8	2 bbl.	9.75	10.0	−0.25	270	265	+ 5
	V-8	2 bbl.	9.75	10.0	−0.25	300	305	− 5
	V-8	4 bbl.	9.75	10.0	−0.25	315	305	+ 10
Plymouth								
Power Flow 6	6	1 bbl.	8.0	8.0	....	132	132	....
Fury	V-8	2 bbl.	9.0	9.0	....	230	225	+ 5
Fury Super Pak	V-8	4 bbl.	9.0	9.0	....	260	250	+ 10
Golden Commando	V-8	4 bbl.	10.1	10.0	+0.1	305	305	....
Pontiac*								
	V-8	2 bbl.	8.6	...	....	215	...	....
	V-8	2 bbl.	8.6	8.6	....	245	240	+ 5
	V-8	4 bbl.	8.6	8.6	....	260	255	+ 5
	V-8	2 bbl.	10.0	10.1	−0.1	280	270	+ 10
	V-8	4 bbl.	10.0	10.1	−0.1	300	285	+ 15
	V-8	4 bbl.	10.5	10.1	+0.4	330	285	+ 45
	V-8	3, 2 bbl.	10.5	10.5	....	345	300	+ 45
Rambler*								
	6-L	1 bbl.	8.0	...	....	90	...	....
	6-Ovh	1 bbl.	8.7	8.7	....	127	127	....
	6-Ovh	2 bbl.	8.7	8.7	....	138	138	....
	V-8	4 bbl.	8.7	8.7	....	215	215	....
	V-8	4 bbl.	9.7	9.7	....	270	270	....
Studebaker								
	6-L	1 bbl.	8.3	...	....	90	...	....
	V-8	2 bbl.	8.8	8.3	+0.5	180	180	....

*Model names not included because models can be obtained with various combinations of carburetors and compression ratios.

Compression

Chrysler went up. It increased compression ratio in one or more models in each of its five lines.

General Motors held steady. GM offset increases in Buick and Cadillac with decrease in Oldsmobile. The Pontiac and Chevrolet were kept pretty much the same.

Ford went down. It lowered compression ratio on the Edsel line sharply, cut back some on Mercury, and eased off on all the Ford models.

Horsepower . . . While compression ratios did a see-saw, horsepower and displacement of 1959 engines kept an upward trend.

Here's the boxscore on 56 new models and their options:

Compression ratios: 16 up, 16 down, 24 unchanged.

Horsepower: 26 up, 13 down, 17 unchanged.

Displacement: 25 up, 3 down, 28 unchanged.

Failure of compression ratios to move up will not mean less pressure on motor-fuel quality. This pressure will be maintained by several factors:

. . . Changes to achieve economy. These include leaner fuel-air ratios, better volumetric efficiencies in low and medium speed ranges, lower rear-axle ratios, etc. Each in varying degree, puts pressure on motor-fuel quality.

. . . Failure of refiners to improve gasoline quality. The improvement has been less in the last 12 months than in any comparable period for some years. At present, gasoline will satisfy a lower percentage of cars than it did a year ago. This gap will increase unless quality is increased.

. . . Elimination of West Coast as a depressing influence. Instead of being lower than national average, West

Coast gasoline is ahead on quality. An arithmetical average of premium in six West Coast cities in October was 98.9 RON compared with a national average of 98.7. A year ago the same cities averaged 97.4 when the national average was 98.1.

This means that Detroit is no longer forced to hold back on compression ratios to allow its cars to operate on West Coast fuel.

Quality picture . . . Refiners this year averaged only a 0.2-RON increase in gasoline quality.

Last year from the period of January 1 to end of August, the improvement was 0.8 RON, four times as great.

This quality slowdown probably was one major barrier which kept the lid on compression ratios. Detroit is reluctant to make high-requirement cars if fuel octanes are not already available to handle them.

Refiners, caught between this year's lag in octanes and next year's increase in percentage of higher requirement cars on the road, may be forced into a big move next year. It appears a full octane number jump will be needed for refiners to maintain position. Average premium quality thus may hit the magic 100-mark in early 1960.

This pressure for higher quality fuel will be increased by the manufacturers despite the apparent lip service to economy in this year's models. And the highly advertised emphasis on economy is a bit misleading. Several auto makers have confined their economy moves to a single model while at the same time increasing the horsepower and displacement in engines of other models.

Pontiac is just one example. Six Pontiac models produce from 5 to 45 more horsepower than their 1958 counterparts. To achieve economy, Pontiac has introduced an entirely new model with hydramatic transmission and a special cam that produces 215 hp. compared with last year's low of 240.

Another example of economy: All four Mercury engines last year had a 10.5:1 compression ratio. This year three were cut back to 10:1 and the fourth to 8.75:1. Horsepower on three was cut by 38 to 55 hp. but on the fourth the power came down 102 points.

Big and powerful . . . The new cars reveal that Detroit on the whole still believes the U. S. motorist wants size and power more than economy.

Even with the minor accent on economy, most of this year's cars are longer and a little wider than ever before. The Mercury Monterey is 4.6 in. longer than a year ago, the Plymouth 2.2 in., and the Pontiac Star Chief 5.2 in.

The one car that contradicts this trend to bigger and more powerful cars is the Edsel. Its four 1958 models all had 10.5:1 compression ratios, and their horsepower ranged from 300 to 345. The 1958 Edsel equaled the high in compression ratios, has few superiors in horsepower, and was second only to the Continental in displacement.

The 1959 Edsel almost duplicates the Ford in compression, horsepower, and displacement. This complete redesign of the Edsel is a bit of evidence that Ford considered its prod-

Wash day at the drillsite

IN PREPARING material for Petroleum Panorama, the Journal's forthcoming salute to the 100th anniversary of oil, the exploration department had a lot of fun going through piles of old pictures and historical sketches. The objective was to find appropriate photos of men, activities, and places.

We found more than we could use in some spheres of exploration activities. In others, we found none. How, for instance, could we illustrate the section on reserves? Ever seen a picture of a reserve? That one was solved by our imaginative art department which came up with a sketch of various sized barrels scattered across a U.S. map.

In the section on early methods of exploration, we had very little difficulty. Fortunately, there were many usable pictures gleaned from the files and archives of the oil industry all over the country.

One of the prize specimens in this category evoked a lot of humor. You can see it here. What puzzled us was why this character chose to do his laundry at the well site and, secondly, why he was standing at such stiff attention. Somewhere along the way some photographer had scribbled a number right across the laundry hanging on the line, but this was purely assumption. Perhaps this was his laundry mark. At any rate, we decided to use the picture.

Petroleum Panorama will trace exploration from its beginning and cover every phase of the oil-finding profession. Besides the sections on early methods and reserves, there are summaries of geophysics and how it grew, the various types of oil traps, the geographic spread of discovery across the U. S., the great oil fields of history, the development of well logging, and the foreign search.

Exploration is probably the most romantic part of oil history, and the exploration staff of the Journal is very smug about this point. But we believe you'll agree that they have assembled an accurate, concise history of their profession when you receive your copy of Petroleum Panorama next January.

ucts too far out front last year. The move began early in the year to cut back the Edsel's fuel requirements and by the end of the 1958-production year these requirements were close to those built into the 1959 car.

One noteworthy casualty of changes in 1959 models is fuel injection. It was available last year on Chevrolet, Chrysler, DeSoto, Dodge, Plymouth, and Pontiac. This year it is optional only on the Chevrolet.

The lineup . . . And now for a closer look at individual changes.

Buick may be classed as the "hot" car of the 1959 models. Compression ratios have been increased from 0.5 to 1.0, horsepower on the Invicta and Electra by 25, and displacement by 37 cu. in. Buick provides more torque at lower and medium speed ranges, goes in for leaner mixtures, has larger intake and exhaust valves, and a redesigned camshaft. It has cut its crankcase capacity from 5 to 4 qt.

Chevrolet's big changes are the introduction of the 11:1 compression ratio option and a reduction in the six-cylinder horsepower from 145 to 135. This, plus some redesign, will result in up to 15% fuel economy, according to manufacturers' claims.

Chrysler has bigger engines all along the line but has reduced engine weight by some 100 lb. and has cut coolant volume a third. The latter results in speedier engine warmups and, Chrysler claims, "noticeable fuel economy on short trips." Chrysler claims up to 10% fuel economy, mainly because of improved carburetion and manifolding and an economy rear-axle ratio of 2.93:1.

DeSoto makes no concession to the economy-minded buyer in 1959. In fact, by making its 350-hp. Adventurer engine optional on all models, it seems to be reaching for a bigger share of the high-requirement market.

Dodge has increased compression ratios on most models. It achieves economy on its 9.2 compression ratio V-8, up 0.2 from a year ago, by providing a 2.93:1 gear ratio which cuts engine speed and saves gas.

Edsel drops from a prestige class to competition for the low-priced three. It largely duplicates the 1959 Ford and is priced "within $50 or less of the top series Chevrolets, Plymouths, and Fords."

Ford reduced the compression ratio on all models but with minor horsepower losses. It credits better economy to improved combustion-chamber design and changes in crankshaft, carburetor, manifolding and ignition system. New jets on the two-venturi carburetors on the 292 and 332 cu. in. engines aid fuel economy. Ford recommends regular gasoline for all models and claims its six will get 400 miles on a 20-gal. tank full. It recommends oil changes every 4,000 miles.

Mercury moved back so steadily from its 10.5:1 compression ratio this past year that early company publications on 1959 models listed higher compression ratios than finally emerged.

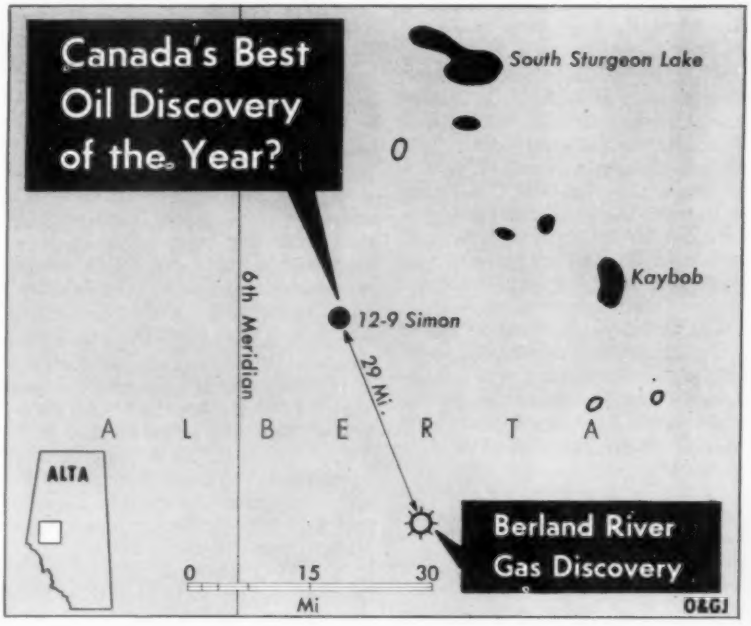
Oldsmobile was the one General Motors car to cut back on compression ratios. Part-throttle knock was more prevalent this year and induced this change in some of the 1958 leaders. Oldsmobile upped horsepower in two of three models despite the drop in compression ratio.

Plymouth is largely unchanged from 1958. It pitches its economy claims on a lower rear-axle ratio. A 2.93:1 ratio against last year's low of 3.73:1 results in up to 6% fuel saving, Plymouth claims. This plus a new camshaft, redesigned manifold, etc., raise total fuel savings close to 10%.

Pontiac is an example of 1959's larger size. Its models are up to 9 in. longer, 3.3 in. wider, and 3 in. lower than in 1958. It also has a new economy rear-axle ratio. It is 2.87:1.

Rambler is unchanged from a year ago but will have a new competitor in the low-power field in Packard-Studebaker's Lark. Rambler has a larger engine but lower compression ratio than the Lark but both are credited with 90 hp.

Studebaker's Hawk is very much the same as a year ago but has an increased high-compression ratio, up to 8.3 from 8.0.



Alberta Oil Discovery Hailed

. . . as possibly most significant so far this year. Shell well flows both gas and oil and could be a major field.

AN ALBERTA well is a possible candidate for Canada's most significant oil find of the year. It could turn out to be the country's first major field discovery of 1958.

The new well, the 12-9 Simon of Shell Oil Co. of Canada, Ltd., is 35 miles from the nearest reef oil, and it is the first oil production in that part of the sedimentary basin.

It is 35 miles southwest of South Sturgeon Lake D3 oil field and 35 miles west of Kaybob field. The well is 29 miles northwest of Berland River, the country's biggest gas well.

Shell's 12-9 Simon flowed gas and 400 bbl. daily of 47.5°-gravity oil from the Woodbend reef (Upper Devonian) during drill-stem test at 11,420-70 ft.

Shell was running further test at 11,570 ft. after establishing at least a 115-ft., water-free zone.

The new oil find is on a lease block selected from Petroleum and Natural Gas Reservation No. 1787, which was farmed out to Shell by the Petrol-Explorers group.

TGT Bounces Back

. . . with new plan to serve upper Midwest market after FPC turns down all applications. Nothing new has been filed by Northern Natural or Michigan-Wisconsin.

MIDWESTERN Gas Transmission Co., rebuffed in its first bid to crack the upper Midwest gas market, is returning to the Federal Power Commission with a stronger proposal split into two parts.

Midwestern, a Tennessee Gas Transmission Co. subsidiary, is asking, in one application, that it be allowed to furnish gas to the Chicago-Gary area from TGT's Gulf Coast supplies. In the second application to be filed later this year, it will propose supplying areas in Minnesota, Wisconsin, Michigan, and North Dakota with Canadian gas.

FPC rejected the application that combined these plans on grounds that Canadian gas was not available (OGJ, Nov. 3, p. 45). It also rejected proposals of Northern Natural Gas Co. and Michigan - Wisconsin Pipe Line Co. to serve the areas with U. S. gas.

But it told the three companies to come up with new plans. And this Midwestern-TGT did immediately.

New U. S. line . . . Midwestern beefed up its application for the Chicago-Gary area by proposing:

. . . A 350-mile, 30-in. line, instead of the original 24-in., costing $50,815,000, from Portland, Tenn., to Joliet, Ill.

. . . A gas supply of 360,000 M.c.f. daily in contrast to 115,000 M.c.f. in the earlier application.

. . . A plan that will not be tied to Canadian supplies, which must yet be made available by Canadian government action.

TGT filed a companion application with FPC to support Midwestern. It asked approval of a $61,548,000 project, including 158 miles of 36-in. loops in Louisiana and Mississippi, to deliver gas to its affiliate at Portland.

New marketing plan . . . Midwestern has taken a new approach to selling gas to Chicago and Gary customers.

Instead of selling directly to large industrial users, Midwestern would sell to three utilities—Peoples Gas Light & Coke Co., Northern Indiana Public Service Co., and Northern Illinois Gas Co. Midwestern proposed originally to sell directly to U. S. Steel and Inland Steel plants. Under the revised plan, the plants would buy from the utilities.

Midwestern proposes to deliver 100,000 M.c.f. daily to Northern Indiana starting next fall, 150,000 M.c.f. in the second year of service, and 200,000 M.c.f. at the start of the third year; 100,000 M.c.f. to Peoples Gas Light & Coke; and 60,000 M.c.f. to Northern Illinois.

FPC decision . . . The FPC order does not kill the idea of importing Canadian gas into markets of the upper Midwest or elsewhere.

The commission, in fact, expressed a firm belief that the time will come when it will issue permits for new imports from both Canada and Mexico. But that will be when problems of supply and commitments are worked out.

The Borden report and FPC action made one thing clear, however. Canadian gas, when it is exported to the U. S., will bring a higher price than the 20 cents per M.c.f. set in the agreement between Midwestern and Trans-Canada.

The commission's 50-page decision discussed the Canadian gas problem at some length. It also gave its reasons for turning down all three companies' plans and intimated that these objections should be satisfied in new applications "to meet the immediate and long-term natural-gas requirements of the north-central and midwestern areas of this country."

Why the rejection . . . The basic reason for turning down the Midwestern proposal was the lack of an adequate Canadian gas supply. But the FPC also objected to the proposed sale of gas to steel companies in the Chicago area.

And it questioned Midwestern's idea of tying the Canadian and U. S. gas sources together with a relatively small diameter line (24-in.), since the two could not be used alternatively for the greater part of the customers at either end.

Northern Natural was turned down on the ground that it had failed to prove the feasibility of its proposed Redfield, Iowa, storage project. Michigan-Wisconsin, it said, failed to prove the economic feasibility of its proposal. The findings on these companies followed the recommendations filed by Examiner Francis L. Hall.

Views on Canada . . . Turning to the Canadian situation, the FPC expressed the opinion that, if the Canadian authorities eventually permit exports, "Canadian gas should and inevitably will be made available to this and probably other areas of the country."

This would benefit both Canadian producers and U. S. purchasers, the commission said. And it would "be consistent with the policies of cooperation and joint endeavor which have long characterized the relations of this nation and Canada."

The Borden Commission report "does not alter our decision which is based on Trans-Canada's gas supply," it was asserted.

"While permission from the Canadian Government to export gas, and further authority from the Province of Alberta are absolutely essential, we would not delay issuance of our certificate until Trans-Canada obtains these authorizations," the FPC explained.

"Where the basic difficulty lies is that it has not been shown that Trans-Canada will be able to satisfy Canadian market requirements and also the requirements of Midwestern."

Even though imports cannot be approved at this time, the FPC commented, it foresees the time when "it may be possible to connect the systems supplied by Canadian gas with the systems supplied by American gas so that Canadian and American sources will be interconnected from the gulf to Canada across the breadth of the United States."

The new applications to be filed by the companies will be treated as separate cases from those disposed of in the report. But the FPC indicated it would move quickly to pass on them by using evidence and testimony already in the record.

Texas Import Probe Resumes

HEARINGS by the Texas imports-study commission will be held in Midland November 14.

French M. Robertson, Abilene oil man and commission chairman, said the group will take evidence on effects of oil brought into Texas from other states and the possible influence on state market demand. Imports from the Four Corners area will be emphasized at the hearing.

He said the commission will file a detailed report with Gov. Price Daniel soon after the hearing. Later, the commission may recommend legislation. This is the fourth hearing held by the commission since its creation early this year (OGJ, Feb. 17, p. 65).

Dow Completes Big Chemical Complex

NEW UNITS at Dow Chemical Co.'s Louisiana division are now turning out a variety of basic and intermediate products made from salt water and light hydrocarbons.

Dedication ceremonies last week at Plaquemine, 10 miles south of Baton Rouge, climaxed a 2-year, $65-million building program. Five major units have been put in operation since production first started at the vinyl-chloride plant in July (see photo).

Products from all units will include caustic soda; chlorine; glycols and oxides of ethylene and propylene; chlorinated solvents to include carbon tetrachloride, ethylene dichloride, perchloroethylene, and trichloroethylene; vinyl chloride; and hydrochloric acid.

The new installations are spread over 500 acres of a 1,900-acre site on the west bank of the Mississippi River. Brine-producing facilities are in Assumption Parish. Brine is piped 30 miles to the main plant.

California Drilling

affected by action to cut down residual fuel yield.

THE RESIDUAL fuel glut in California is resulting in fewer wells being drilled, higher average production, and deeper average depth per completion.

Here's the picture:

... **Drilling is way off.** Completions are running 31% behind last year.

... **Average production** per completion so far this year is 102 bbl. daily. Last year it was 96 bbl. In 1956 it was 92 bbl.

... **Average well depth** is 4,800 ft., compared with 4,373 ft. last year for all completions, dry or successful.

In a move to cut down residual yield at the refinery, California operators have practically halted drilling for the heavy crude found in shallow zone fields. Instead, most drilling has been for light crude in the deeper zone fields, which have higher barrel-per-day production.

The drilling contractor has been hard hit. Speaking at the Society of Petroleum Engineers meeting in Los Angeles recently, S. I. Williams, president of Haney & Williams Drilling Co., said only 45% of California's available rigs are working.

The companies with deep rigs are in the best shape as 61% of the rigs with a range of 10,000 ft. or more are in operation. Only 47% of the rigs in the 5,000 to 10,000-ft. range are on jobs. And only 27% of the rigs with a range to 5,000 ft. are working.

the JOURNAL *said*.....

50 *years ago*

November 20, 1908

As a rule oil and gas operators do not consider a personal knowledge of geology or the opinion of an expert geologist of much value in determining locations for test wells, either in virgin territory or in drilling with the object of extending a proven field. If the surface indications suit him and the roll of the land looks good to him the average oil man will go ahead on his own "hunch." There are exceptions of course, and some notable ones. Several of the largest producing companies on the Pacific Coast place the utmost reliance in the opinions of their regularly employed geologists.

Humble remains the most active of all Gulf Coast fields, reporting 13 completions in the first half of November, of which 11 were producers with initial output of 3,750 bbl., and 2 were dry.

25 *years ago*

November 9, 1933

The move on the part of the U. S. Government to recognize Russia has significance from several angles to the oil industry in this country. A primary motive in the recognition admittedly is to widen the market for American products.

For the first time since Secretary Ickes of the Department of Interior fixed the production of crude oil in the United States at 2,338,500 bbl., the actual output of oil is below that figure. In the week ending November 4, production fell to an average of 2,313,182 bbl.

J. Marston Linehan, of Tulsa, has joined Cosden Pipe Line Co. as assistant to B. R. Graham, manager.

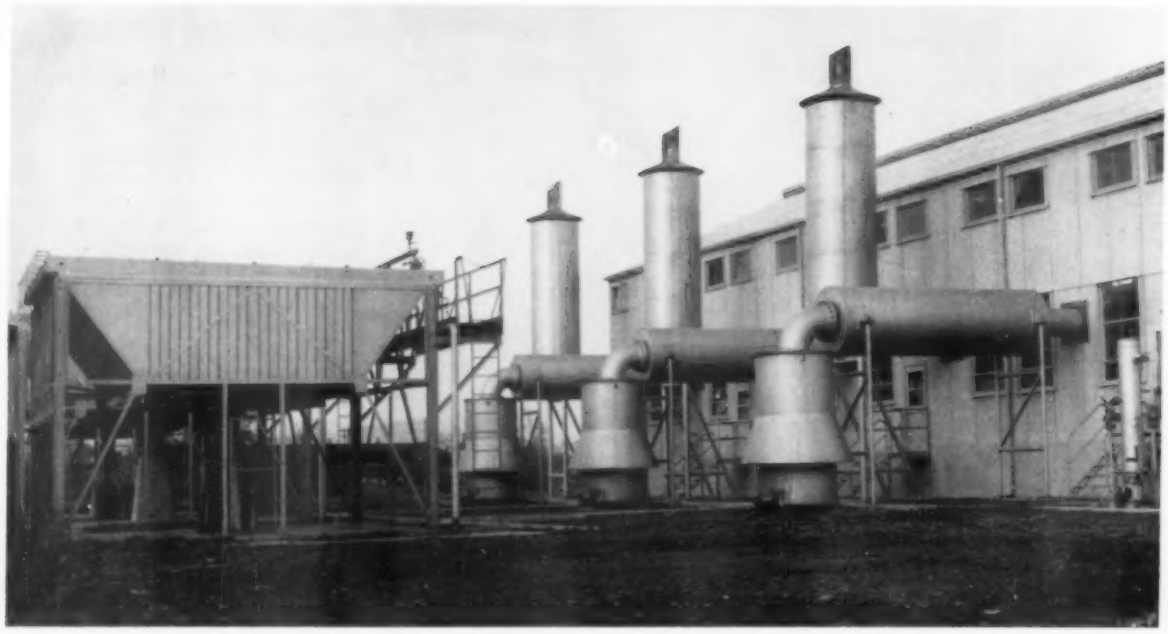
10 *years ago*

November 11, 1948

Details of the new Houdriflow catalytic cracking process were reported for the first time at the forty-first annual meeting of the American Institute of Chemical Engineers held in New York.

An out-of-court settlement between the shareholders in Iraq Petroleum Co. over the "Red Line" agreement has been reached, thereby clearing the way for the formal consummation of the corporate structure of Arabian American Oil Co.

Disagreement among shareholders as to the right of Standard Oil Co. (N.J.) and Socony-Vacuum Oil Co. to become partners in Aramco has delayed for more than a year and a half the full participation of these companies in Aramco's development of Saudi Arabian petroleum resources.



TEXAS EASTERN'S Linden, N. J., compressor station can be controlled either from . . .

Texas Eastern Is Making Big Strides

• For the first time, a gas-engine reciprocating compressor station is run by remote control. This breakthrough on the toughest pipeline-control problem will speed up automation in gas transmission. Several months of trial runs have proven the new satellite is reliable.

A MILESTONE in remote control was disclosed last week at Texas Eastern Transmission Corp.'s Linden, N. J., compressor station.

Linden is the company's first venture in remote operation and the first of this type in the industry. The station is controlled from Lambertville, N. J., 50 miles away, where only an operator and an oiler are on duty.

The operator, besides running the manually controlled Lambertville station, has complete control of the Linden station. He is able to start and stop the compressor engines and monitor all operating conditions which are represented on the control board in different colored lights, gages, and meters.

Texas Eastern's experience since the station was started up last spring proves an important point to the industry. It demonstrates that this type of station can be operated remotely. It is a big step in gas-pipeline automation because reciprocating stations, the most complex to control, are standard on most gas lines in the country.

A. J. Shoup, vice president and chief engineer of the company, expects Linden to become a signpost of this type of automation.

"The use of this new remotely controlled station and its related equipment is expected to open up a whole new field of operational technique for the natural-gas pipelining industry," he told the trade press during a special tour.

"Texas Eastern has been studying the principles of remote operation of compressor stations for some time and expects to place at least four other remotely operated compressor stations in use during the next year."

Progress in automation . . . The Linden installation is part of a steady program toward automatic operation by Texas Eastern, whose 6,000-mile system extends from Mexico to the New York-New Jersey area and has daily capacity of over 1.7 billion cubic feet.

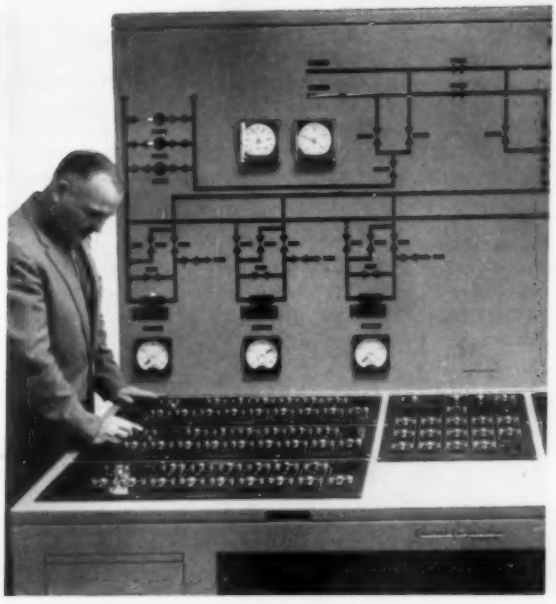
Its gas-turbine and electric-driven centrifugal stations in recent years have been designed for local push-button control, easily adapted to remote control. The difference in the Linden operation is that the button is pushed from 50 miles away instead of 50 ft. There is one attendant on duty at Linden, but his responsibility is for the grounds and not station operation. A maintenance crew also operates out of Linden but has no duties there.

The other four stations mentioned by Shoup are gas-turbine centrifugals in Pennsylvania. They will be the first of their type under remote control.

These advances point to the acceptance of remote operation by gas pipelines, which have lagged behind liquid lines. Modern remote control of crude and products stations started 8 years ago and has since been applied to some 200 pump stations.

The first main line compressor station to be operated remotely was the experimental Stanton, Ky., satellite of Gulf Interstate Gas Co. in 1956 (OGJ, Aug. 16, 1956, p. 66). The company completed five fully automatic stations this year. All are engine-driven centrifugals, operated from Nashville, Tenn. This is also the

. . . A **CONTROL** room at the station or . . .



. . . **FROM LAMBERTVILLE,** 50 miles away . . .

in Remote Controls

point which monitors operations and controls discharge pressures on the system's five semiautomatic reciprocating stations (OGJ, July 14, 1958, p. 114).

The local push-button compressor station is becoming common. The bold steps by Gulf Interstate and Texas Eastern will encourage others to take the next move.

Pressure for automation . . . The trend to automation stems not from a desire to cut manpower but to increase efficiency. For remote control, which adds highly skilled instrument and communication men to the pipeline's staff, will not necessarily result in a net reduction of personnel.

"The ultimate goal of remote-operated stations is to provide facilities for a centrally controlled pipeline where one operator could dispatch the maximum throughput of gas through a pipeline with a minimum of down time and reduce maintenance of the system," according to F. Vinton Long, chief of the communications section for Texas Eastern.

The advantage of using sequence control equipment is to prevent human error—for example, the failure to open or close a valve during engine startup which might prevent proper starting or operation or even damage equipment or the pipeline. Supervisory equipment can operate a station more safely and efficiently than men, and rising costs exert a strong pressure for its adoption.

Linden station design . . . Being the "tail-end" station, Linden presented unusual design requirements.

It will be operated mainly during the winter to deliver increased volumes and meet peak heating demands. The load will fluctuate widely.

The design had to provide for reliability, flexibility, and quiet operation, since the station is located in a residential area.

The widely varying load conditions were against selection of the centrifugal compressor. The electric motor was ruled out because of high electric-power demand charges. The gas turbine, which is most advantageous where large power packages are needed, was eliminated because engineers wanted at least three units at the station.

The combination which was chosen was three 2,050-hp. Clark turbocharged gas-engine reciprocating compressors. One, two, or three of the units may be operated at from 60% to 110% of rated speed. The reciprocating compressor offers further flexibility by varying the number of pockets which are loaded. Provision has been made to add three more units when demand warrants.

For reliability, the compressor unit was made complete with all auxiliaries. Lube-oil supply and jacket-water cooling systems are driven off the engine crankshaft. Thus the auxiliaries are not vulnerable to electric-power failure.

Low noise level was achieved in various ways to make the station a "good neighbor" in Linden. Silencers were installed on inlet air and exhaust. Pulsation bottles reduced piping vibration. The turbocharged units cut noise by eliminating the scavenging cylinder. Blowoffs 30-in. in diameter, instead of smaller ones, will reduce noise during shutdown.

Control and Communications . . . Linden can be controlled either by telephone lines or microwave.

Both systems link Linden and Lambertville and both have been used successfully, but the wire-line circuits are used normally. The system has been designed to transmit minimum data needed for station operation. It will also afford a chance to gain information for future design and to study problems applying to other installations as well.

Linden may be controlled from the Lambertville compressor building, from the Lambertville control room, or locally if remote operation is not desired. The operator may start and stop Linden engines, monitor all operating conditions, adjust engine speed, and operate compressor cylinder valves and pockets.

If the station is ready to be started,

an amber light on the control panel will indicate that the 35 permissive requirements for starting have been fulfilled. A blue light will flash on to tell the operator when the signal has been received at Linden and the starting sequence begun. The amber light will go out as the starting sequence begins, and when the engine comes up to a speed of 50-75 r.p.m., the green light indicating it was stopped will be turned off.

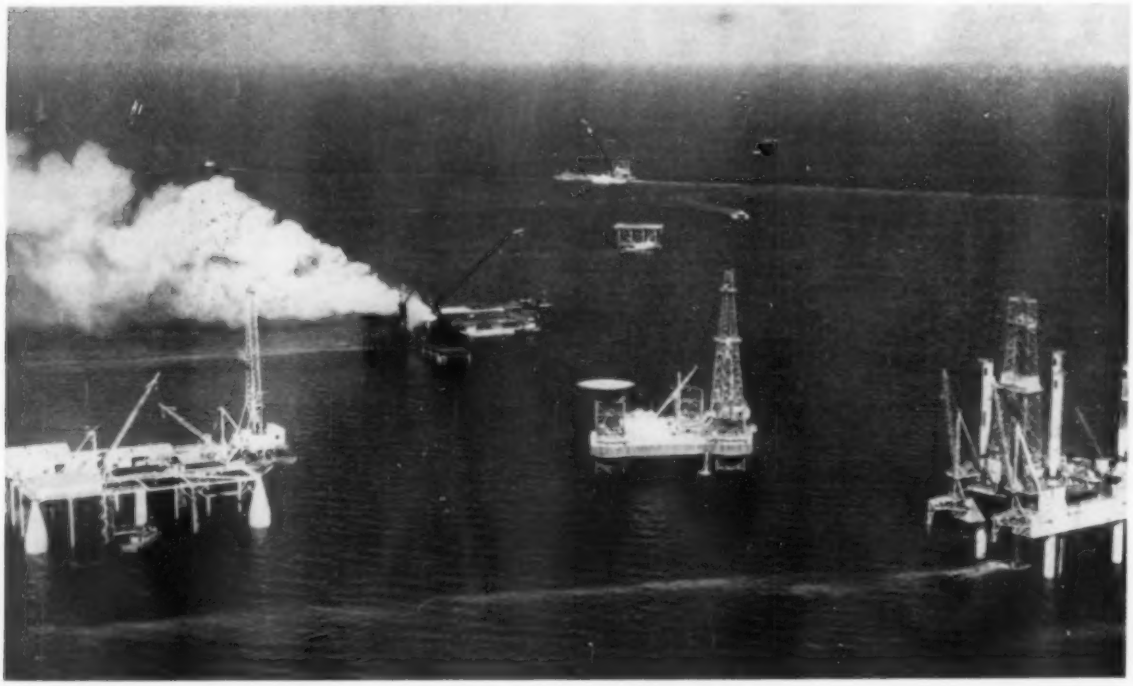
The speed buildup is indicated on the tachometer. When the engine warms up and suction and discharge valves are open and other unit valves closed, the blue light will go out and a red light will come on to show it's ready to go on the line. The sequence took 13 minutes when it was demonstrated last week. A high-speed telemetering system, capable of indications five times a second, monitors engine speed so that significant changes may be known immediately. Other variables are telemetered on a 15-second cycle.

Main valves are opened and closed by gas-operators equipped with limit switches. Gas pressure to insure valve closure when a line breaks is provided by a storage tank floating at line pressure. The engine control functions which are done manually at attended stations are handled by electric solonoid controls operated by electrical sequencing equipment. Automatic valve operators adjust cooling water valves, oil valves, and hydraulic oil valves.

Protective feature . . . The change of any condition being monitored by supervisory equipment starts a scanning cycle of 18 seconds. The position of more than 90 alarms may be indicated during this cycle.

Detection devices warn of crankcase explosion, engine overload, vibration, overspeed, high discharge pressures and temperatures, engine rod and cylinder temperature, and provide for alarm, shutdown, lockout, or blowdown. Alarms also are provided for fire, presence of explosive mixtures, or illegal entry to the station.

The Linden station is not likely to become the prototype of future Texas Eastern stations. But it will be the starting point for future designs, based on experience gained in operating this station remotely.



Rig 46 Vinegarroon Mr. Gus II

Relief Holes Near Goal in Wild-Well Battle

THREE BIG RIGS were grinding steadily downward last week in a costly effort to snuff out two CATC offshore wells which were still burning wild.

Plans are to drill into the formations from which the wells are producing and to pump salt water and, if necessary, mud and cement, into the reservoirs to choke off the flow.

Late last week Kerr-McGee's Rig 46 was below 7,200 ft. with 2,300 ft. to go; Zapata Offshore's Vinegarroon was below 5,500 ft. with 700 to go; and Glasscock's Mr. Gus II was below 7,400 ft. with 1,900 ft. more to drill.

Still afire were No. 5 and No. 7 wells on CATC's collapsed 45-E platform 20 miles off the Louisiana coast. Well No. 2 was blowing salt water. The platform originally held seven producers, at least five of which were burning at one time following an explosion October 15.

Officials of Continental, Atlantic, Tidewater, and Cities Service, which form CATC, still were not sure last week of the cause of the disaster. Investigations are being made by Coast Guard and by insurance companies.

Loss in the incident still has not been determined but is expected to total several million dollars.

Continental told its stockholders in a quarterly report that the company's share in the cost of controlling the wild wells "may be in the neighborhood of $1 million."

Divorcement No Issue

. . . in trial of West Coast firms as judge rules against government plea they be forced to get out of marketing.

SEVEN MAJOR West Coast oil companies have been assured they won't have to get rid of their retail marketing facilities, no matter how the Government's 8½-year-old antitrust suit turns out.

It was the second major ruling against the Government by Federal Judge James Carter.

Earlier he had dismissed the Justice Department's suit against the Conservation Committee of California Producers. In this ruling he said he could see no reason for the committee to be a defendant in the first place.

Judge Carter, who is presiding over pre-trial hearings, last week also postponed the scheduled November 12 trial date until February 3, 1959. He ordered both sides to explore the possibility of settling the suit out of court in the meantime.

Lawyers involved in the suit estimate it would take up to 2 years to hear the case if it should come to trial.

Surprise for some . . . Commenting on his latest ruling against the retail divorcement and divestiture phase of the government's suit, Judge Carter said:

"This will amaze some of the people, and surprise the rest.

"If the defendants were forced to dispose of the service stations and it should develop thereafter that the courts had been wrong — that economic dislocation was even greater than existed before — you couldn't undo what you would have done.

"You cannot unring a bell. I am convinced that the dislocations that would occur would be of such a nature that I don't think we can fully imagine or comprehend with any accuracy what would be the result. We certainly would have thrown on the market a vast number of valuable properties—even over a 5-year period."

The Government's divorce and divestiture request would have required the companies to dispose of their retail outlets over a 5-year period.

Carter labeled his own ruling "an extraordinary one" but said everything about the case is extraordinary.

Charges stand . . . Still facing the seven remaining defendants — Standard of California, Texas Co., Richfield, General Petroleum, Tidewater, Union, and Shell—are a number of other antitrust charges involving production, transportation, refining and crude oil marketing.

The ruling against the divestiture request and dismissal of the Conservation Committee eliminated just two of 22 "prayers" contained in the Government's suit.

Many of these other "prayers" are on shaky grounds, as Judge Carter commented that the Government had already conceded that the firms have eliminated some former practices since the suit was filed in 1950.

"Using the analogy of the small boy, the defendants have put on clean shirts and have brushed their hair and cleaned up their necks," Judge Carter said.

An attorney for the Government declined to comment on what effect these latest rulings would have on the Justice Department's next moves. Lawyers for the defendants also declined comment on the impact of Judge Carter's ruling on the over-all case.

Attorney Howard Painter of General Petroleum ventured this opinion:

"It seems probable that the decision will shorten the trial at least so that it can be tried within our lifetimes."

New Slant on Road Octanes

. . . will make their calculation easier, SAE told by Ethyl and Phillips research men. Factor will cut road testing.

A FOURTH FACTOR has been uncovered in estimating road octanes of fuels from lower-cost laboratory methods.

Uncovered by a research team from Ethyl Corp. and Phillips Petroleum, this factor will sharpen refiners' calculations of the payoff in gasoline quality without going to costly road testing.

Research and Motor ratings and the over-all percentage of olefins and aromatics are well-known factors in determining road octanes. But some fuels identical in these respects still show varying performance in cars on the highways.

The difference is due to the relative amounts of high and low-boiling olefins and aromatics, the Ethyl-Phillips team told the SAE in Tulsa last week.

They found three important relationships:

1. Low-boiling olefins including the pentenes, hexenes, and heptenes with boiling points up to 210° F. generally provide better road octane performance than do the heavier unsaturates boiling above 300° F.

2. Similarly, the aromatics boiling below 300° F. including benzene, toluene, the xylenes and ethyl benzene appear to be better than the heavier aromatics. This preference applies at the lower engine speeds. There is no important difference at higher speeds.

3. There are no significant differences in road octane number due to the distribution of aromatics boiling between 210° F. and 300° F. These include the xylenes and ethyl benzene.

The tests . . . These findings came from extensive testing of 20 specially blended 100-RON fuels. Each contained 5% butane with the remainder divided into four boiling ranges, each representing a fixed fraction of the total fuel.

Twelve blends were made up by statistical design to permit comparisons of light and heavy fractions of both hydrocarbon types. Eight special blends were added to give particular comparisons.

Each fuel was road-tested in three standard 1957 and 1958 production cars using the Modified Uniontown method. Three models equipped with experimental 11:1 compression ratios were tested with the Modified Borderline technique and results converted to Modified Uniontown.

In addition to findings on effect of olefin and aromatic distribution, the team gained further information on the relation of hydrocarbon types.

As expected, paraffins are consistently better than either olefins or aromatics, they found. In the lower and higher boiling ranges, this superiority of paraffins over olefins increases with engine speed. When olefins are substituted for aromatics in the boiling range over 300° F. road octane depreciates significantly.

Oklahoma Crude Has Seven Prices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Below 20	2.73	2.66	2.63	2.34	2.29	2.41	2.05
20-20.9	2.75	2.68	2.65	2.38	2.33	2.45	2.09
21-21.9	2.77	2.70	2.67	2.42	2.37	2.48	2.13
22-22.9	2.79	2.72	2.69	2.46	2.41	2.51	2.17
23-23.9	2.81	2.74	2.71	2.50	2.45	2.54	2.21
24-24.9	2.83	2.76	2.73	2.54	2.49	2.57	2.25
25-25.9	2.85	2.78	2.75	2.58	2.53	2.60	2.29
26-26.9	2.87	2.80	2.77	2.62	2.57	2.63	2.33
27-27.9	2.89	2.82	2.79	2.66	2.61	2.66	2.37
28-28.9	2.91	2.84	2.81	2.70	2.65	2.69	2.41
29-29.9	2.93	2.86	2.83	2.74	2.69	2.72	2.45
30-30.9	2.95	2.88	2.85	2.78	2.73	2.75	2.49
31-31.9	2.97	2.90	2.87	2.82	2.77	2.78	2.53
32-32.9	2.99	2.92	2.89	2.85	2.81	2.81	2.57
33-33.9	3.01	2.94	2.91	2.88	2.85	2.84	2.61
34-34.9	3.03	2.96	2.93	2.91	2.89	2.87	2.65
35-35.9	3.05	2.98	2.95	2.94	2.93	2.90	2.69
36-36.9	3.07	3.00	2.97	2.97	2.97	2.93	2.73
37-37.9	3.09	3.02	2.99	2.99	2.99	2.95	2.75
38-38.9	3.11	3.04	3.01	3.01	3.01	2.97	2.77
39-39.9	3.13	3.06	3.03	3.03	3.03	2.99	2.79
40-44.9 or Above	3.15	3.08	3.05	3.05	3.05	3.01	2.81

Oklahoma Crude Cut

. . . but nearly every buyer posts a different schedule, both for top price and differential on lower gravities.

FOUR LARGE BUYERS of Oklahoma sweet crude added to the price confusion last week when they separately announced new postings bearing price cuts.

Each buyer either cut a different amount or used a different sliding differential for the lower-gravity crudes.

The accompanying table shows what Oklahoma producers face: six different schedules, plus a seventh which is a field price for trucking the oil to market, and three differentials.

Top prices for Oklahoma sweet now range from $3.01 to $3.15 a barrel with low quotations for 20°-gravity and below ranging from $2.41 to $2.73.

This is the current price picture:

. . . **$3.15 top with 2-cent** differential for each degree of lower gravity (the old price) is still maintained by Phillips, Shell, Sohio, Pure, and a few others. They represent about 75,000 bbl. daily of Oklahoma purchases.

. . . **$3.08 top with 2-cent** differential, a 7-cent cut, is now posted by Indiana Oil Purchasing and Continental. They buy 43,000 bbl. daily.

. . . **$3.05 top with 2-cent** differential, a 10-cent cut, is posted by Magnolia which buys 13,500 bbl. daily.

. . . **$3.05 top with 2-cent** differential between 36-39.9°, a 3-cent differential between 31-35.9°, and a 4-cent differential for crude below 31° is posted by Sinclair. About 40,000 bbl. daily is involved.

. . . **$3.05 top with 2-cent** differential between 36-39.9° and a 4-cent differential below that is posted by Cooperative Refining Association on 11,000 bbl. daily.

. . . **$3.01 top with 2-cent** differential between 36-39.9° and 3-cent differential below that is posted by Sunray, Kerr-McGee, Anderson-Prichard, Midland Cooperatives, Champlin, and Bell. They buy a total of 200,000 bbl. daily.

. . . **$2.81 top with 2-cent** differential between 36-39.9° and 4-cent differential below that is posted by Derby and others at the field for Oklahoma Panhandle crude which is trucked to market in Kansas.

Magnolia, Indiana Purchasing, Sinclair, Continental, and Cooperative Refinery announced their cuts last week.

The new lower-gravity schedules actually will not penalize too much Oklahoma sweet crude since much of it is above 36° gravity.

Other areas also received price cuts last week. Esso Standard Oil Co. reduced 15,000 bbl. daily of Arkansas and North Louisiana crude by 5 to 15 cents a barrel. Average cut was 11 cents. Sohio Petroleum made reductions in the same area ranging from 10 to 20 cents a barrel.

Quaker State Oil Refining Corp. cut the price of Pennsylvania-grade crude 8 cents a barrel in Allegany field. New top is $3.82 a barrel.

Forum Maps Plans

to push new economy drive. Study groups organized.

THE NEWLY formed oil-industry conservation forum last week got down to brass tacks.

The steering committee of the rapidly growing voluntary group, formed to push for modernized conservation laws and regulations so as to cut costs of domestic oil production, held its first formal meeting November 4 in Houston.

Five regional subcommittees were formed, each to study oil laws and rules and methods of state agencies in its particular area and recommend action directed at improving them.

The subcommittees will tackle this job in these five regions: Rocky Mountains; Oklahoma and Kansas; Texas; New Mexico and Arizona; and

PROCESSING

A second polyethylene plant is slated to go on stream in June 1959 at Dow Chemical Co.'s Texas division at Freeport. The new plant will be adjacent to Dow's present polyethylene facilities. The expansion program also includes an addition to the ethylene purification facilities.

A new additive known as "Rocket-Age Lionite" has been introduced in Lion brand gasolines for marketing in eight southern states. Lion brands are products of Lion Oil Co., a division of Monsanto Chemical Co.

HiCal, a new petrochemical high-energy fuel, will be mass produced for the first time next year at Callery Chemical Co.'s new Muskogee, Okla., plant. The $38-million unit will convert boric acid, hydrogen, and ethylene to a fuel which the Navy will test in such propulsion systems as turbo-

Alabama, Arkansas, Louisiana, and Mississippi.

Oil men, both majors and independents operating in these areas, will be named to the subcommittees responsible for that area. Subcommittee members will be announced as soon as they accept appointments. Appointments will be announced by Jake Hamon, Dallas independent who heads the steering committee.

The conservation studies made by each subcommittee will be submitted to the parent steering committee at its next meeting now slated tentatively for early December.

More officials elected . . . Fifteen of the steering committee's 20 members attended the November 4 meeting.

They named Jerome J. O'Brien, San Antonio, vice chairman of the steering committee, and J. U. Teague, Houston, vice chairman of the forum's general committee. O'Brien, a former president of the Texas Independent Producers and Royalty Owners Association, will assist Hamon.

Teague, outgoing president of the American Association of Oilwell Drilling Contractors, will work with E. B. Miller, Jr., vice president of Tidewater Oil Co. at Houston and forum chairman.

In other action, the committee named another subcommittee to maintain liaison and cooperate with the Interstate Oil Compact Commission. J. E. Vickrey, Dallas, is chairman. Other members are Darwin Kirk of Tulsa and Jack Tarner of Bartlesville.

New Yardstick for Volatility

. . . is introduced at SAE Tulsa meeting. It may help in blending light ends to gasoline without vapor lock.

THE PRESSURE is mounting for higher volatility gasolines. But today's cars put a ceiling on this characteristic.

Introduced last week at the SAE Fuels and Lubricants Meeting in Tulsa, was a new simplified method for matching fuel to engine tolerance.

The technique, explained by L. E. Hebl of Shell, involves the selection of Fahrenheit temperature as the scale of measurement. By relating the various factors in fuel-handling systems and modern motor fuels, refiners can make better use of high-octane, high-volatility components in their gasoline.

A closer relationship between fuel volatility and tolerance is becoming more important each year, said Hebl. As octanes continue to rise, the refiner finds himself with fewer and fewer hydrocarbons that he can blend to gasoline.

Years ago, several hundred hydrocarbons were acceptable. In the next several years, the number may dwindle to 50 or fewer. Unfortunately these surviving 50 include many of the lighter hydrocarbons whose greater concentration boosts gasoline volatility.

The trend to higher engine speeds brought about by automatic transmissions has increased the importance of those few hydrocarbons which rate high in the Motor method octane test. This situation is ruling out about 100 olefin hydrocarbons. Again, the more volatile components are the ones which still perform well under these conditions.

These factors, plus the increased availability of light ends from greater field processing of natural gas, have combined to raise average Reid vapor pressure of premium grade gasolines marketed over the past 20 years. Summer premium has risen from 7.1 to 8.6 lb. and winter premium from 9.0 to 11.0. Regular grades have added about 1 lb. in RVP.

Shell's studies of various road-test programs uncovered three disturbing observations. There is a considerable spread in volatility tolerance of the best and worst cars in any large sampling. For the past 10 years the vapor pressure tolerance constant for the car population has risen steadily. But air conditioning and some fuel filters reduce this tolerance.

Shell reported that a "bonus" in adding volatility without risking vapor lock can be obtained by blending fuels with steeper distillation curves. Some new limits of safety in volatility were suggested, which would permit the blending of more light components to gasoline. The Shell studies also indicated that vapor pressures could be increased more rapidly than is customary during September and October.

BRIEFS . . .

jets and ram-jets. An enormous steam plant will provide thermal energy for making diborane. An unusual feature of the plant is a liquid distillation column handling both solids and liquids.

Tetraethyl-lead prices will go up about 0.6 cent per pound. Both Du Pont and Ethyl Corp. posted new prices effective December 2. Based on equivalent tetraethyl lead content, Du Pont prices will be about 60.75 cents per pound for motor mix, 61.75 cents per pound for motor mix A, and 66.65 cents per pound for aviation mix. Ethyl raised prices to comparable levels for motor mix, motor plus, and aviation mix.

A refrigeration-type gasoline plant near Spearman, Tex., will be completed this month by Northern Natural Gas under a contract to Dresser Engineering, Tulsa. The plant will remove liquids from 100,000 M.c.f. of gas daily and will have dehydration capacity of 200,000 M.c.f. daily. The plant will serve the Hansford-Ochiltree counties area in the Texas Panhandle. It is tied into Northern's main line going to Beaver, Okla.

More research in making gas from coal and oil is under way at Illinois Institute of Technology for the Institute of Gas Technology. Further work is under way on gas transmission and distribution, peak load gas processes, petrochemicals, gas chromatography, the fuel cell, and radiation chemistry.

Also for Refiners . . .

IN THE NEWS: Octane requirements of 1959 cars still will be higher due to engine changes designed for economy—this despite an easing off in the rise in horsepower and compression (p. 90) . . . New factor in calculating road octanes has been uncovered by Phillips and Ethyl researchers (p. 99) . . . More buyers have cut price of Oklahoma crude. Result is seven different pricing schedules (p. 100) . . . Shell has new way of matching fuel to engine tolerance (p. 101) . . . Soviet officials are demanding faster construction time on new refineries to keep pace with production (p. 105).

PLUS THESE TECHNICAL REPORTS: Timely leveling off is predicted in refinery-capacity construction next year (p. 116) . . . Absorber-tray effectiveness in propane recovery (p. 107).

Leasing Plan Hit

. . . by Texas operators. Oil men say highway commission plan to lease rights-of-way would permit drainage and wreck many conservation programs.

TEXAS OIL MEN are riled up over a Texas Highway Commission proposal to grant leases on highway rights-of-way in oil and gas-producing areas.

A number of arguments was presented by opponents in oral testimony and written statements at a hearing on the proposal November 1 in Austin.

Lined up against such leasing were four industry associations, a great number of independent and major oil firms, and several groups outside the oil industry. The associations included the Texas Mid-Continent Oil and Gas Association, the North Texas Oil and Gas Association, the Panhandle Producers and Royalty Owners Association, and the West Central Texas Oil and Gas Association.

The highway commission says the state owns mineral rights on roughly 211,000 acres of right-of-way. About 26,000 acres are in oil-producing areas. The highway department purchased all of this right-of-way prior to 1943. Since that time it has pursued a policy of obtaining only surface easements.

The strips of land in question cross many of the prolific older fields in Texas—such as East Texas field.

Waste threatened . . . Operations in such fields, opponents of the plan argued, would become chaotic if rights-of-way are leased.

Operators drilling on such narrow strips of land could not possibly recover their investment unless they were permitted to drain oil from under adjoining leases.

Producers on adjoining leases in many cases would be forced to drill many unnecessary wells to try to minimize such drainage. This would upset orderly spacing patterns long in effect. It would also hike the per-barrel producing cost of Texas oil at the very time the industry is trying hard to reduce it to meet world competition.

Right-of-way leasing in unitized areas would be utterly disastrous, the operators testified. Under Texas law there is no way that unit operators could force the highway strips into the units.

At last count in Texas, they pointed out, there were 9,500 wells (mostly in older areas) connected to recycling and pressure-maintenance plants. Such projects and other secondary-recovery programs would be severely harassed and perhaps destroyed if the commission proposal were carried out.

Legality doubted . . . Jack Vickrey, testifying for Texas Mid-Continent, told the commission it likely does not have the legal authority to grant leases on the highway strips.

Vickrey cited a 1954 court decision wherein mineral rights were returned to the adjoining landowner, the original minerals owner, when the latter contested a lease granted by the commission on a right-of-way strip. The decision was based on assurances to the landowner initially that the land would be used only for highway purposes.

Thus, he said, validity of the state's ownership of mineral rights under highways generally is questionable. Also, the state acquired its mineral deeds without title examination. Endless litigation would follow any commission effort to grant leases based on such ownership.

All past legal opinions by the attorney general's office indicate that the commission cannot legally lease the highway mineral rights, Vickrey added.

He urged that the commission defer any such leasing until the legislature specifically authorizes it to do so.

Commission backing off? . . . Indications are that the highway commission, confronted with such strong opposition, is weakening a bit.

A commission spokesman at the hearing said that body has no intention of permitting drilling on highway right-of-way or of attempting to resume buying mineral rights.

"The people, however, own these mineral rights and it is felt that any oil coming from under this right-of-way belongs to Texas taxpayers." He said he felt some settlement could be worked out fair to all "so that the state can be paid for the oil taken from under the highway rights-of-way by wells on adjoining property."

Sources well informed on the issue predict that the strength of the opposition, not only on the part of the oil industry but from politically powerful farm and landowner groups, will influence the commission to hold off leasing until specifically authorized to do so by the legislature. The same sources think it unlikely that the industry would oppose such a bill if it were written to remove inequities and avoid confusion.

The hearing was the second held by the commission on the issue. The first was held quietly in early March to hear proponents of right-of-way leasing.

Joining forces with oil interests to oppose the proposal were the Texas Good Roads Association; the Fort Worth, Texas, and Southwestern Cattle Raisers Association; and the Texas Farm Bureau.

PIPELINE BRIEFS . . .

Transwestern Pipeline's application for a $189,798,000 gas line from West Texas to California will be heard by the FPC starting December 15. Transwestern proposes to transport 350,000,000 cu. ft. daily to Pacific Lighting Gas Supply Co. through a 1,809-mile pipeline system. Applications of 15 independent producers seeking sales certificates will be heard at the same time.

A $20-million expansion by Texas Gas Transmission has been approved by the FPC. The project includes 92 miles of 30-in. in Louisiana and Mississippi, 19 miles of 26-in. between Hardinsburg and West Point, Ky., 12½ miles of 16-in. in Jefferson Davis and Acadia parishes, Louisiana, and 15 miles of 16-in. in Kentucky, Indiana, and Illinois. Texas Gas will boost capacity by 133,700 M.c.f. daily with the looping and compressor expansion at Pineville, La.; Kenton, Tenn.; Calvert City and Slaughters, Ky.; Dillsboro and Petersburg, Ind.

The old Sinclair Pipeline system in the Allegany district of Pennsylvania has been taken over by Quaker State Oil Refining. The move will provide a market for Penn Grade crude formerly refined at Sinclair's Wellsville, N. Y., refinery which has been shut down. The Sinclair system includes more than 300 miles of 2 and 4-in. line in the Bolivar and Wellsville areas. Quaker State is now refining more than half the crude produced in Allegany field and is offering the rest to other Pennsylvania refiners.

Oil has no monopoly on big offshore installations in the Gulf of Mexico, as shown by Freeport Sulphur Co.'s operations off Grand Isle, La. A 700-ton deck section is shown being lifted by a J. Ray McDermott barge with an 800-ton lifting gear. The structure will support the power plant and steam generator units to be used in mining sulfur from wells located in the background. The offshore sulfur deposits were discovered by Humble Oil & Refining Co. while exploring for oil.

A subcontract for 150 miles of 3½/16-in. gas line has been awarded to Mid-States Construction Co. by Harbert Construction Corp., contractor for Houston Texas Gas & Oil Co. in Florida. Harbert has the contract for lateral lines in Florida for the Baton Rouge-Miami line which will be supplied by Coastal Transmission Corp. Mid-States is under way.

A $3,655,400 project, including 37 miles of 26-in. loops, 4 miles of 10-in. supply line, and a 1,320-hp. compressor station at Minden, La., has been approved for Mississippi River Fuel Corp. The FPC granted a certificate permitting Mississippi River Fuel to buy up to 35,700,000 cu. ft. of gas daily from Arkansas Louisiana Gas, which will spend $331,800 for a 1,320-hp. compressor and meter station. Terms of the contract are for 5 years, expiring April 16, 1963.

A 440-hp. compressor station is being installed by Montana-Dakota Utilities in South Elk Basin field, Wyoming. Stearns-Roger Manufacturing will complete the station this month. The utility recently completed a 12- mile, 12-in. loop of its main line between Laurel and Billings, Mont., under contract to Albrecht Construction Co.

Also for Pipeliners . . .

IN THE NEWS: Interior Department is standing firm on Aneth shutdown until line to handle excess gas is completed (p. 88) . . . TGT comes back with a new plan to serve upper Midwest gas market (p. 94) . . . Automation in gas transmission will be speeded by Texas Eastern's first use of remote control operations at gas-engine reciprocating compressor station (p. 96) . . . Shell is stepping up the gas capacity of its pipeline from La Paz field near Lake Maracaibo to Cardon (p. 106).

A complete list of pipeline projects is carried in the last issue of each month. Current projects are reported in pipeline briefs.

PLUS THESE TECHNICAL REPORTS: Pipeliners will build 98,000 miles of line to meet industry needs by 1965 (p. 115) . . . Safe welding on gas-filled pipelines (p. 135) . . . Multiphase flow in pipelines (p. 156).

New Economy Barge Is Ready

. . . for trial off West Coast. Use of ready-made onshore equipment eliminates high-cost design and fabrication.

A NEW offshore drilling barge—noteworthy because of its cost-cutting design—is ready for testing in California waters.

The outfit consists of a virtually complete onshore rig and derrick, with some modifications, mounted on a barge which was cut out of the forward section of an old T-2 tanker.

The builder, Western Offshore Drilling & Exploration Co., is confident the barge can do everything the specially designed floating barges can do — and for substantially less cost.

As much ready-made onshore equipment is used as possible. For instance, service companies have driven their land-based units on board, mounting them on jacks rather than building special equipment into the barge.

What's involved . . . The barge itself is 252 by 68 ft. With 600 tons of equipment aboard, it will draw 7 ft. of water.

Tankage for 3,000 bbl. of fresh water is built into the barge. It will be anchored on site with two 10,000-lb. and three 6,000-lb. anchors.

The 108-ft. derrick is built over a 12-ft.-square center well. Substructure is 10 ft. high with a 27-ft.-square working space on the derrick floor. With a National 80 draw works using 3½-in. drill pipe, the rig has rated capacity of 10,000 ft.

The contractor hopes to be able to rack pipe in doubles in the derrick. No other floating barge attempts to do this.

The barge is signed up by the Phillips Petroleum Co.—E. W. Pauley interests to core drill two parcels off the coast of Santa Barbara. Western Offshore Drilling is a subsidiary of Haney & Williams Drilling Co.

INDUSTRY BRIEFS . . .

Hudson Gas & Oil may have a small, shallow-zone heavy crude discovery in its second Los Angeles Country Club test, although the well is officially listed as temporarily suspended at 8,121 ft. First Hudson well on the golf course is temporarily suspended at 9,367 ft. A third test was drilling ahead below 128 ft. last week. All three are reported to be directional holes.

Magnolia Petroleum has completed its purchase of oil-producing properties in Lake Washington field in South Louisiana from Freeport Sulphur Co. Magnolia is paying $100,000,000 to Freeport Sulphur for working interests ranging from 10 to 50% in 58,000 acres.

Solid fuels with more energy will be developed for "across-the-board" military purposes by four companies named to work on a broad research program. Esso Research & Engineering, American Cyanamid, Dow Chemical, and Minnesota Mining & Manufacturing were successful bidders from about 30 companies who offered proposals. The Advanced Research Projects Agency will let the three military services negotiate $1 to $2-million contracts with each firm during the first year of the work.

Maiden voyage has been completed by Sinclair's newest tanker, the SS Edward L. Steiniger. The 44,000-ton Steiniger delivered 303,000 bbl. of Kuwait crude to Sinclair's Marcus Hook refinery. The tanker was built in Kure, Japan, by National Bulk Carriers, Inc. Sinclair now owns or controls 490,000 dwt. in tanker capacity. Next year the 24,500-ton Harry Jeffries, recently launched in Sweden, will up this total.

Gas reserves in Southeast Ada field, Bienville Parish, Louisiana, have been sold by Veliki Beckerek Corp. to Calder & Kelly, Inc., Shreveport, and others. The deal, which involved more than $1,000,000, includes producing wells, pipelines, and joint separation and processing facilities. Gas deliveries to United Gas Pipe Line Co. will start soon. Making the purchase with Calder & Kelly were Ohio Oil Co., L. L. Robinson, and Don P. Miller.

The Louisiana legislature meets this week to substitute the present gas-gathering tax with an increase in the severance tax on gas. Gov. Earl K. Long called the 12-day special session, starting Tuesday, because a threatened lawsuit contesting the gathering tax would tie up an estimated $40 million in much needed state revenue.

Long has suggested raising the present severance tax of 0.3 cents per thousand cubic feet to 2.3 cents. He says this would bring in approximately the same amount as the 1-cent gathering tax which would be repealed.

THIS NEW PLANT helps boost throughput in Russia where . . .

Red Refining Is Hard Pressed

. . . to keep pace with production. Slow construction irks chiefs who are shooting for 6-million-barrel increase.

SOVIET OFFICIALS are counting on faster building time and bigger plants to meet their target.

Startup for a standardized, 120,000-bbl. plant is now 5½ years after groundbreaking. Full-scale operation takes another 2 years.

Smaller plants in the planning stage are giving way to the 120,000-bbl. model. Design of larger, 240,000-bbl. and 360,000-bbl. plants is getting priority.

The Russians have said capacity must increase 5,000,000 to 6,000,000 bbl. daily in 15 years to keep up with crude production. But this target may be raised in view of success in the producing end of the industry.

The minister for mineral resources says that "it seems likely the target of 7,000,000 bbl. to 8,000,000 bbl. daily by 1972 can be substantially exceeded."

Crude production gains this year have been ahead of schedule. Output was about 2,230,000 bbl. daily the first 9 months.

There is now a shortage of refining capacity in Russia due to slow construction time and a cutback in capital expenditures for processing equipment in 1954 and 1955.

Orders have gone down from the top that building time for large plants "can and must" be reduced from 7½ years to 3 or 4 years. By comparison, the new 135,000-bbl. Delaware refinery of Tidewater Oil Co. went into operation in 26 months.

Downstream processing facilities of a standard 120,000-bbl. plant include 28,000-bbl. catalytic cracking, 20,000-bbl. catalytic reforming, and 28,000-bbl. visbreaking. The typical design calls for three two-stage distillation units, and as a rule two units for each special process, such as catalytic cracking, reforming, and visbreaking.

Planners, however, are pressing for construction of larger plants. They say a 240,000-bbl. plant costs 14% less per barrel of output than a 120,000-bbl. refinery.

Crude supply . . . Most of the new refineries will be built in the "Second Baku" region between the Volga River and Ural Mountains.

But facilities also are being built or planned along pipelines west of the Volga and east of the Urals in central Siberia. By 1960, about 62% of locally refined crude will be from "Second Baku" fields in Tataria, Bashkiria, and Kuibyshev Province.

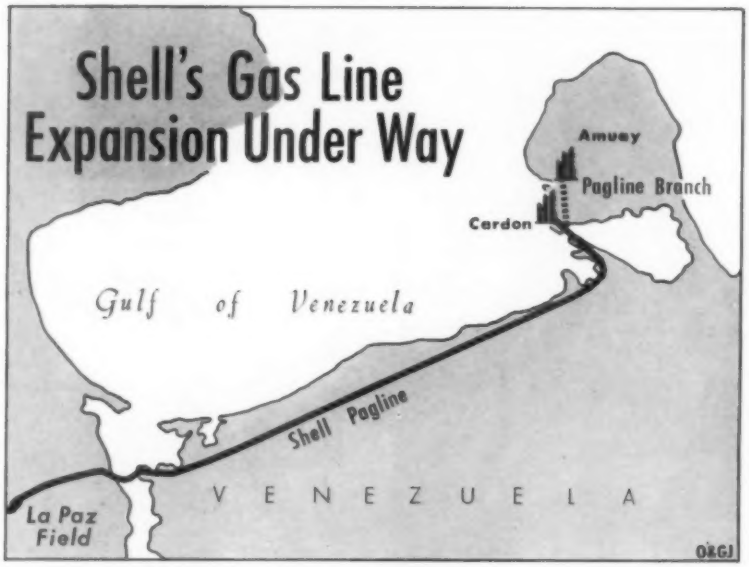
These crudes normally contain 22% to 25% gasoline fractions with a boiling point up to 200° C. Diesel oil fractions run 23.5% to 24.5%. Distillates run 21.5% to 25% with a boiling point range from 350° C. to 500° C.

The high-paraffin crudes yield more light oil than crudes from the old Baku area in the Caucasus. But Volga-Ural crudes have a high sulfur content and refineries using them have twice as high equipment-repair and overhaul costs.

Products . . . . Fastest-growing product demand from the new refineries is for diesel fuel and jet aircraft fuel. Sulfur content of diesel oil in the new plants will be limited to two-tenths of 1%.

Russia also needs higher-quality automobile and truck gasoline. The Scientific Research Institute for Automobile engines pointed out that hundreds of millions of rubles per year could be saved if Soviet cars and trucks would switch to "high-quality 70-74 octane gasoline," instead of burning the low-octane product sold in the state-monopolized market.

Part of the gasoline made at the new plants will be in the 87-90 octane range.



Shell Stepping Up Pagline Capacity

NATURAL GAS from La Paz field west of Lake Maracaibo will be fed into boilers of refineries on Paraguana Peninsula at the rate of 100 million cubic feet daily when Cia. Shell de Venezuela completes expansion of its Pagline system.

Part of the increased throughput will be sold to Creole Petroleum Corp. for its Amuay refinery. An 8½-mile, 16-in. branch to the 345,000-bbl. plant will carry 30 million cubic feet daily. Capacity of the 178-mile, 20-in. system to Cardon refinery is 44 million cubic feet daily.

Shell is stepping up the capacity of its system by adding a compressor and booster station next to its La Paz gas plant. New equipment to be installed includes two compressors, each with a normal capacity of 41 million cubic feet daily, 7,000-hp. Westinghouse gas turbines, and four 12-cylinder Thomasson compressors rated at 25 million cubic feet daily.

The new station is scheduled to open by mid-1959. It will cost $5,250,000.

The Shell pipeline extension to Amuay is expected to open early next year. The pipe will be protected with an anti-corrosive bituminous coat and buried almost 2½ ft. deep. Cost of the project will be $780,000.

German Firm Stays in Syria

. . . with U.A.R.'s blessings. But American companies are ordered to relinquish concession, give up equipment.

A WEST GERMAN firm exploring in Syria is continuing its drilling program without interrruption, in contrast to the hard time given Americans by the United Arab Republic.

Ste. des Petroles Concordia, operator for Deutsche Erdoel, A.G., has three rigs on its Syrian concessions. Two are drilling ahead in wildcats, and the third is rigging up.

The picture is different for Syrian-Arabian Oil Co., formed by J. W. MenHall, an American independent, to finance operations on 11 tracts covering 770,000 acres. MenHall Prospecting & Exploration Co. acquired the rights in 1955.

U.A.R., after cancelling Syrian-American concessions last month, has now taken into custody the company's assets, property, and equipment. The latest move was another sign that U.A.R. has decided to develop Karatchok field on its own hook, possibly with Russian help.

The Egyptian - Syrian Government says exploration rights were annulled because of violations of the concession agreement. It charges that drilling did not cover a wide enough area and that an interest in the operation was transferred to Atlantic Refining Co. without approval. Atlantic Refining is one of two partners which came into the program later. The other is Portsmouth Steel Co.

MenHall's first wildcat at Karatchok in northeast Syria gave the country its first discovery. Since then, three more wells have been completed, rated at 500 bbl. to 700 bbl. daily (OGJ, Oct. 13, p. 86).

German program . . . Concordia is rigging up for its fourth wildcat in Syria.

The well is 12 miles southeast of Kameshli, near the Turkish border in the easternmost part of Syria. The well is about 75 miles west of Karatchok field.

The first test, El Bouab 1, was abandoned at about 10,700 ft. Some noncommercial oil shows were found which encouraged further drilling on the structure. El Bouab 2 is drilling ahead at 5,200 ft. at a site 1.2 miles east-northeast of the first well.

Cheikh Sollakh 1 is down to about 8,500 ft. This test is 35 miles southeast of El Bouab 1, and 12 miles east-southeast of Camp Ghouna.

Phillips to Drill in Honduras

THE FIRST WILDCAT on Phillips Petroleum Co.'s new acreage in British Honduras will be spudded before the end of this year.

Making its debut in Central America, Phillips has acquired three blocks of leases and licenses totaling about 2,000,000 acres and covering most of the southern half of the colony, both on and offshore.

The rights were acquired from Bandini Petroleum Co., Belize Petroleum Co., Ltd., and West Caribbean Oil Co., Ltd. The Bandini holdings were obtained last winter (OGJ, Mar. 24, p. 105), but no wells were drilled on the acreage.

Phillips has already started geological and seismic surveys. The first test will be in the Punta Gorda area, which is in the southern, coastal region of the country. The wildcat will probably go to about 10,000 ft.

Gulf Oil Corp. is principal leaseholder in the northern part of the colony. Last fall, Shell Petroleum Co., Ltd., took a 50% farmout on 4,552,000 acres held by British Honduras Gulf Oil Co. (OGJ, Nov. 11, 1957, p. 133).

Persian Gulf Test Slated

THE PERSIAN GULF discovery off Abu Dhabi will be followed up by a second test 10,000 ft. west of the initial wildcat.

Umm Shaif 2 will be drilled from a mobile barge when tests are completed on the first well, drilled 20 miles off Das Island. Umm Shaif 1

flowed at the rate of 2,400 bbl. daily of 40°-gravity crude from lower Cretaceous Shuaiba limestone (OGJ, Sept. 15, p. 120).

The structure is on a 12,000-sq.-mile concession held by Abu Dhabi Marine Areas, Ltd. Owners are British Petroleum Co., with two-thirds, and Cie. Francaise des Petroles, one-third.

Nigerian Well Is Discovery

A WELL DRILLED from a new barge in the Niger River Delta has brought in a discovery.

Krakrama 1 was the second wildcat drilled from a new $3.6-million barge ordered by Shell-BP Development Co. of Nigeria after an intensive survey of the delta area. The well is one of two new Shell-BP discoveries. The other is at Ebubu, in Ogoni.

Both tests were taken to nearly 12,000 ft. Further wells will be drilled to determine the significance of the finds. The wells were the sixth and seventh discoveries made in Nigeria.

Five of the finds have been made this year. The earlier discoveries were at Soku, Bomu, and Calabar. (OGJ, May 5, p. 84). The country's first two fields, at Oloibiri and Afam, are producing a total of about 6,600 bbl. daily on test.

Cuban Refinery Proposed

A CUBAN-BASED company is seeking permission to build a 18,000-bbl. refinery at Nuevitas in Eastern Camaguey.

Cia. Copetroleo, S. A., representatives told government officials they want to invest $25 million in the plant. The refinery would refine Venezuelan crude. Three-quarters of the products would be exported. Backers of the project want a tax exemption under a Cuban law designed to encourage new industry. A decision by the government is pending.

An established local company, Transporte Reca, S. A., plans to build a 2,000 to 3,000-bbl. refinery at Cienfuegos. It has awarded the contract for the $3½-million project to Refinery Engineering Co. of Tulsa. The plant will be designed to permit easy expansion to 5,000 bbl. capacity.

Transporte Reca is a member of the Jarahueca-Motembo association of companies. Some equipment from the existing 2,000-bbl. Cabaiguan refinery may be used in the new plant. The new location will simplify Reca's distribution problems and permit expansion.

Oil Search Widens

in southern China with 16 active exploration crews.

A DERRICK set up in the mountains of Kweichow in southern China is a symbol of progress to the Communists in their expanding search for oil in the south.

The Reds say 16 exploration parties are in the field in the province. So far, they claim to have mapped 300 seepages and 100 structures.

Kweichow lies to the south of Szechwan Province, where the Chinese are developing discoveries within 100 miles of Chungking. They claim to have drilled 20 flowing wells in the area and have another 30 drilling. The producing area covers more than 15,000 sq. miles. Structures have produced at depths from 984 to 6,562 ft.

African Search Abandoned

CONORADA COMPANIES have called it quits in British Somaliland after five dry holes on a 36,000-sq.-mile concession.

The decision to discontinue exploration work came after the fifth well, Yaguri 1, was a duster. Amerada Petroleum Corp. has been the operator in the venture. Its partners are Continental Oil Co. and Ohio Oil Co. Drilling began last year. Continental and Ohio recently pulled out of Egypt. The two were partners in Sahara Petroleum Co. along with Cities Service Co. and Richfield Oil Corp.

The concession lies east of two blocks held by Standard-Vacuum Oil Co., which has 11,000 sq. miles under license in the East African protectorate. Stanvac will start its first well about December 1.

Austria Is Seeking

agreement with Czechs for production from gas field.

PRODUCTION from a gas field straddling the Austria-Czechoslovakia border is being discussed by the two countries this month.

Zwendorf field has half of Austria's total gas reserves. But the field is being produced on both sides of the border, and Austria estimates about 35 million cubic feet daily drifts across the line to the Czechoslovakian side.

Most of the field lies in Austria, which wants an agreement giving each country gas in proportion to the amount of acreage in its territory. Output is now about equal on both sides of the frontier. Total reserves in the field are estimated at 353 billion to 525 billion cubic feet.

Gas formations lying in both Netherlands and West Germany have been produced for years by joint agreement.

Find Brightens Papua Hunt

A NONCOMMERCIAL discovery in Papua may help give exploration a new lease on life in the Australian side of New Guinea.

The find at Puri has come in at a time when the minority partner in the venture is trying to organize a new company to keep the search alive. The partner is Oil Search, Ltd., with 10% interest.

The two major participants decided to withdraw financial support after the Puri test was already under way. British Petroleum Co., Ltd., and Standard-Vacuum Oil Co. each has 45% interest in the program that has cost $67 million without a commercial find.

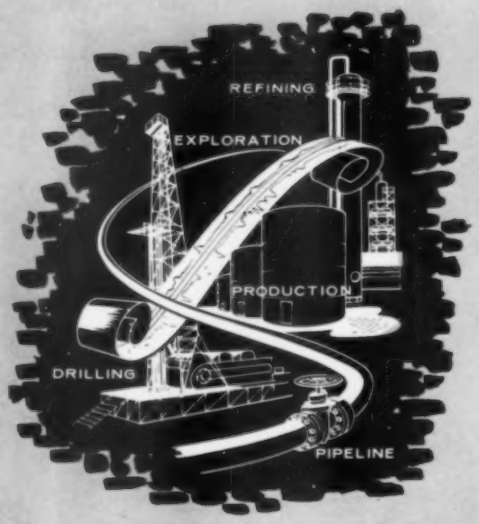
The companies have agreed in principle to the Oil Search plan. This calls for a new firm with a capitalization of $11 million. The two major partners will have their interests reduced to 25% each.

French Well Is Discovery

ANOTHER PART of the Paris basin has yielded oil.

A French company drilling at Chailly, 40 miles southwest of Paris, recovered 38 bbl. of good quality crude on an 8-hour test. The oil came from a 5½-ft. section topped at 5,446 ft.

The well was drilled by Cie. d'Exploration Petroliere (CEP), owned jointly by the government and private French interests. The discovery was the best so far in the region since the Coulommes find east of Paris.



DOWN THE LINE FOR '59

What does the future hold for oil?

Editors of The Oil and Gas Journal in these succeeding pages set down the economic outlook, new tools, techniques, and trends you may expect in 1959—and down the line.

WORLD BRIEFS...

Sinclair Sahara, a subsidiary of Sinclair Oil Corp., is starting geophysical work in Algeria this month. The company, along with Newmont Mining Co., has an interest in two French-controlled concessions in the eastern Sahara.

Loading capacity of the Kuwait Oil Co., Ltd., Ahmadi terminal has been expanded this fall with the construction of 23 miles of 38 and 40-in. gravity flow lines. A 12-mile, 32 and 34-in. line also was laid from Burgan field and a 63-mile, 30-in. line, to be completed next June, will move crude from the big Raudhatain discovery to the Persian Gulf.

Iraq Petroleum is laying 116 miles of loops on its 30/32-in. crude line from Kirkuk to Banias, Syria. The program includes 10 miles of 30-in., 66 miles of 30/32-in., and 40 miles of 24-in. Construction will be completed early in 1959.

Construction on the south Holland section of the Rotterdam-Rhine crude pipeline is moving forward under management of Bechtel International Co.

A group of German and Dutch contractors were successful bidders for 33 miles of 24-in. The line, starting at Pernis, near Rotterdam, and extending to Godorf and Wesseling, West Germany, will consist of 96 miles of 24-in. and 59 miles of 30-in. A 25-mile lateral will run to Wessel, connecting there with a 16-in. line to the Gelsenberg Benzin refinery.

The line will have initial capacity of 180,000 bbl. daily with one pump station at Pernis. Ultimate capacity when fully powered with four stations will be 400,000 bbl. daily. Owners of the line are Caltex, Royal Dutch-Shell, Gelsenberg, and Socony.

Gas injection will start in Kuwait's Burgan field by the middle of next year. Kuwait Oil is installing two compressors driven by 7,000-hp. engines in its first station in the field which produces more than 1 million barrels daily. The initial equipment will return 100 million cu. ft. of gas daily to formation. A second plant will be built later. Both will be automatically controlled.

Heavy fuel oil will be converted into manufactured gas by the Onia-Gegi process in a plant to be built at Yaizu, Japan. Tokai Gas Co. has awarded the construction contract to a British company, Humphreys and Glasgow.

A plant for making platinum reforming catalyst has gone on stream in Amsterdam. It is the first enterprise of Cyanamid-Ketjen, N.V., a new subsidiary of American Cyanamid Co. and Ketjen, Amsterdam.

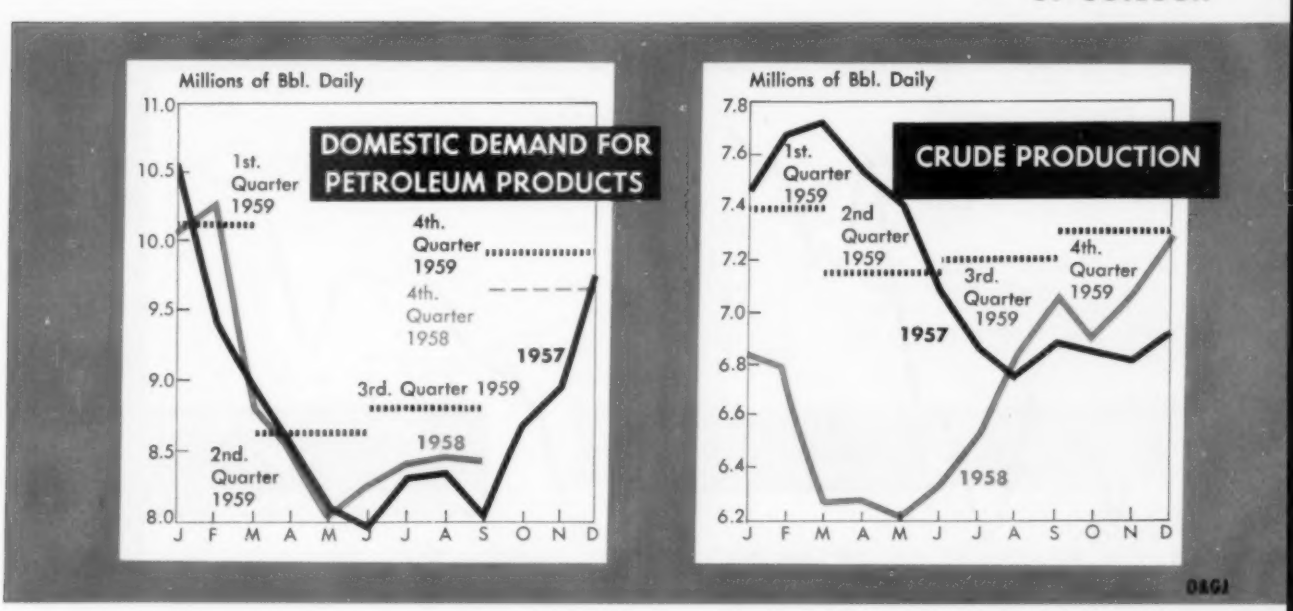
A turbodrill depth record of 15,515 ft. has been set by the Russians in a well on Apsheron Peninsula, near Baku. The well made hole at the rate of 1,378 ft. per month. The deepest hole in Europe was drilled to 15,788 ft. 3 years ago in the same area with a rotary rig.

Russia is planning another major oil play in Bulgaria. This time offshore areas in the Black Sea will be looked at closely. An earlier program fizzled several years ago when a discovery on the northern coast turned out as a comparatively small, 6,000-bbl. daily field.

Surface work has started on a 10,300-sq. mile concession in Somalia held by Standard-Vacuum Oil. The 50-mile wide block runs for 200 miles along the Ethiopian border. Field work will be completed early next year.

A 330-acre site at Mizushima has been purchased by the Japanese affiliate of Tidewater for a new refinery. Mitsubishi Oil Co., half owned by Tidewater, now has one plant, a 42,000-bbl. refinery at Kawasaki, near Tokyo.

Work is starting on Britain's longest crude pipeline, a 60-mile, 18-in. system across South Wales. British Petroleum is building the line to link a terminal it has under construction at Milford Haven with the 70,000-bbl. Llandarcy refinery. The system will open at the end of next year. It will have a capacity of 100,000 bbl. daily.



Down the line: Good growth for oil

THIS HAS BEEN a lean year for oil. Thank goodness, next year and those down the line look much better.

In fact, you can chart your business course on these trends in the next few years:

... **Demand** will be up 3.9% for all products in 1959. Domestic crude production will rise to 7,235,000 bbl. daily. Refinery runs will exceed 8,000,000 bbl. daily. And through 1965, domestic consumption of petroleum will gain at an average rate of 3.6% yearly and gas at a rate of 5.5% yearly.

... **Drilling** will show substantial increases to produce the needed new reserves. A total of 53,000 to 55,000 wells is indicated for 1959. Cost-cutting will be the keynote with faster drilling rates, multiple completions, and use of automation being stepped up.

... **Exploration** will see a new cycle of discoveries set in within next 5 years. The big need: New ideas.

... **Pipeline construction** will continue high. At least 98,000 miles of new lines will be needed within the next 7 years.

... **Refinery construction** for basic crude capacity is slowing down but still will increase by 1.4% in 1959. Units for product quality, however, show little signs of easing off.

That's the way Journal editors, each an authority in his field, view the future for oil. How and why they reached these conclusions is the interesting story on these pages.

Why a lean 1958 . . . Oil expansion in this country depends on two major factors: Domestic demand for petroleum products, and average prices received for products from a barrel of crude.

Both factors were unfavorable this year. Product markets have been weak in most areas. Total demand has been running behind last year.

On top of depressed demand, the oil industry in 1958 was forced into a heavy stock-reduction program. Production cuts, as a result, were severe; and producer income took a beating. Total gross income from crude in the second quarter alone was about $300 million less than for the same period in 1957.

The soft markets created by low demand and high stocks set off a vicious cycle. Refiners followed producers in cutting back. Lower refinery income caused some refiners to cut crude prices which only added to producers' money troubles. This meant less money for exploration and development drilling. Less drilling resulted in idled rigs.

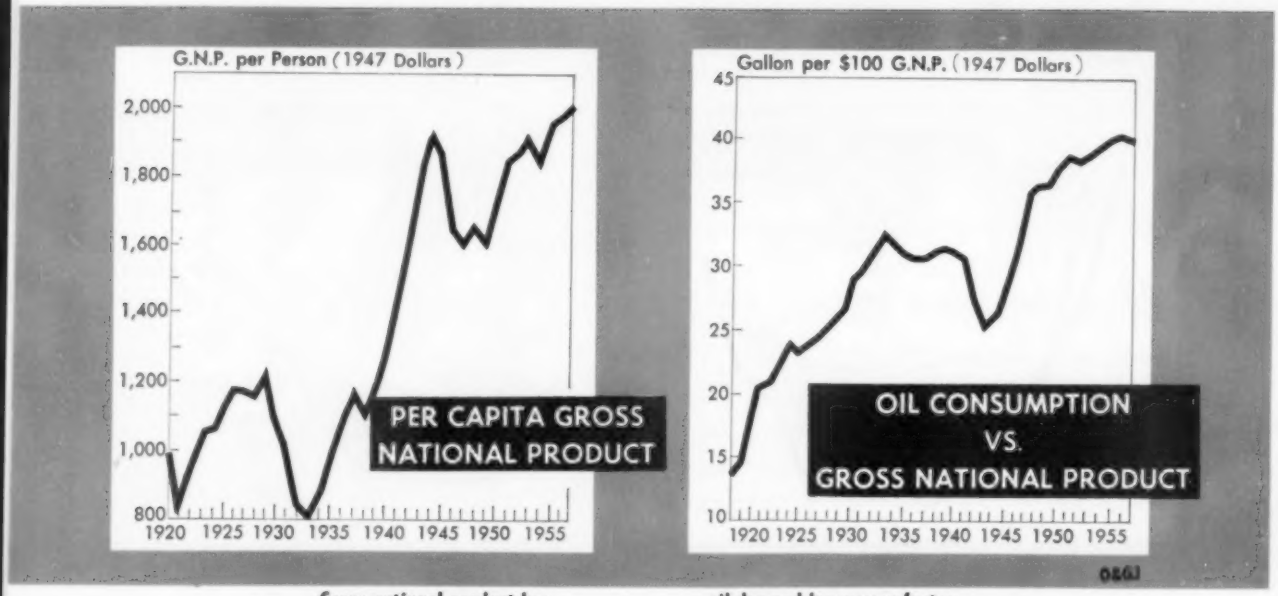
The trend of the year, however, carries a ray of hope. Demand comparisons with last year have been growing better by quarters. Domestic demand has been moving up in recent months so that the third and fourth quarters will show gains over corresponding quarters last year.

Nevertheless, seasonally adjusted demand for last year had a downward trend because of the drop in exports following reopening of Suez. So oil men can't cheer too soon about comparative gains made in the last quarter this year.

On top of depressed demand, the oil industry in 1958 was forced into a heavy stock reduction program. Stocks had become too burdensome.

Crude stocks reached a peak of 285,000,000 bbl. last February. Product stocks at the first of the year had climbed to 560,000,000 bbl., up 45,000,000 bbl. from the first of 1957 and 110,000,000 bbl. from the first of 1956.

Production cuts, as a result, were severe. Total



Gross national product has grown faster than population while **oil demand has grown faster than gross national product**

new supply in the first quarter was 70,000,000 bbl. less than a year earlier. The second quarter was off more—102,000,000 bbl. and crude accounted for 98,000,000 bbl. of this.

Producer income took a beating. Total gross income from crude in the second quarter alone was about $300,000,000 less than for the same period in 1957.

The soft markets created by low demand and high stocks set off a vicious cycle. Refiners followed producers in cutting back. Lower refinery income caused some refiners to cut crude prices which only added to producers' money troubles. This meant less money for exploration and development drilling. Less drilling resulted in idled rigs.

It's brighter . . . The firming current trend of demand can bring more realistic product prices and brighten the industry picture.

This is the season for demand to move up. In winter, increased use of light and heavy heating fuels more than offsets the moderate decline in gasoline consumption.

For the past 7 years, domestic demand for the fourth quarter has shown an average gain of 12.8% over the third quarter. This year should enjoy an even better gain.

The explanation is simple. Fourth-quarter demand last year was not up to par. This means that estimates for this year, based on normal weather, will produce above-average percentage gains.

Total domestic demand averaged 9,143,000 bbl. daily in the fourth quarter of 1957, a gain of only 85,000 bbl. daily over the previous year but a decrease of 21,000 bbl. daily from the record set in 1955.

Domestic demand for the fourth quarter this year should climb close to 9,600,000 bbl. daily. This level would represent a gain of 13.6% over the estimated average for the third quarter. Also it would be a gain of 5% over the fourth quarter of last year.

Barring a definite change in the general supply pattern, December's expected demand will result in a good stock reduction for the fourth quarter. Withdrawals of refined products, however, still may not reach the postwar record for fourth-quarter drops set in 1955.

Outlook for 1959 . . . Demand for most products should show gains.

Here's the product-by-product picture:

. . . Gasoline should top 4,000,000 bbl. daily for the first time.

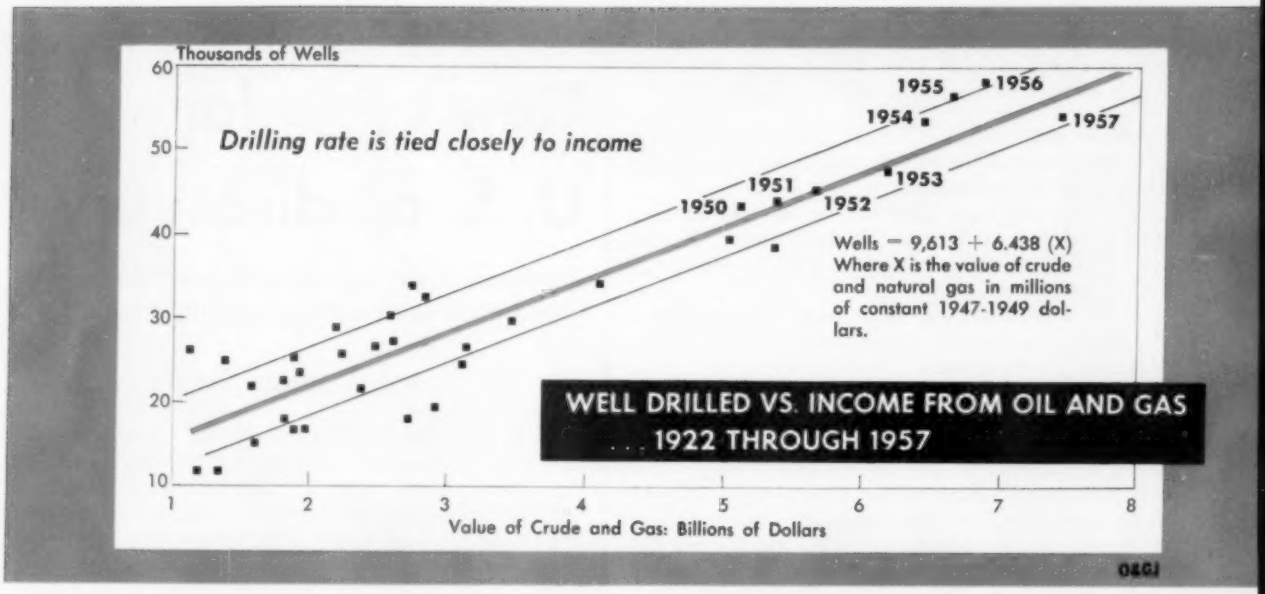
Gasoline demand has gone up consistently since the end of World War II. There have been only three quarters showing decreases, and all have been in the past 2 years. They were the second and fourth quarters of 1957 and the first quarter this year.

Domestic demand for gasoline probably will average about 3,650,000 bbl. daily for the first quarter of 1959, well above the average for the last 5 years. The average for the year should top 4,000,000 bbl. daily for the first time.

. . . Kerosine will drop to 300,000 bbl. daily unless temperatures are abnormally low in the first and fourth quarters.

Kerosine demand, unlike gasoline, has been declining in recent years. Most of the space-heater market has shifted to No. 1 distillate, and rural electrification programs have cut down on use of kerosine for lamp oil.

This year has been an exception. The high rate of consumption in the first quarter pushed sales far enough



ahead to provide an increase. Domestic demand in the first quarter averaged 500,000 bbl. daily, the highest level since the end of the war. As a result, the average for the year is expected to be near 320,000 bbl. daily. Unless there's a reason for an unusual demand, kerosine probably will slump next year to the 300,000-bbl.-daily average.

. . . **Distillate** fuels will climb to 1,860,000 bbl. daily, assuming average weather.

Cold weather in the first quarter of 1958 produced an all-time record demand for the distillates. The average was 2,534,000 bbl. daily, about equal to gasoline demand in 1949.

In fact, distillate is the only major product that will have an increase in every quarter this year compared with 1957. Domestic demand will average a little less than 1,800,000 bbl. daily this year if the remaining portion of the fourth quarter has average temperatures.

. . . **Residual fuel** should average about 1,470,000 bbl. daily.

Another decrease in residual demand will be recorded this year. The total for 1958 will average about 1,440,000 bbl. daily, compared with 1,505,000 bbl. daily in 1957 and 1,538,000 bbl. in 1956.

Part of the 1958 loss has been due to the over-all decline in industrial production and to relative prices of residual and coal.

However, residual prices have been reduced in the fourth quarter enough to bring them in line with coal quotations. And this more competitive price position has tended to increase sales enough to raise the 1958 total to an estimated 1,440,000 bbl. daily.

If these present price relationships are maintained, domestic demand for next year should go to the 1,470,-000-bbl. average.

. . . **Total domestic demand** for all products will climb to a little less than 10,100,000 bbl. daily for the first quarter in 1959.

For the full year, domestic demand is forecast at 9,350,000 bbl. daily for a gain of about 3.9% over 1958. This projection assumes temperatures near average for the winter months.

This adds up to a total average demand for crude and products in 1959 of about 9,625,000 bbl. daily based on an expectation that exports average 275,000 bbl. daily.

The stock picture . . . Crude and product stocks are expected to drop rapidly in November and December of this year, enough to create a snug stock position at the end of the year.

These low stock levels will call for enough new supply in 1959 to increase stocks during the year. It's expected that crude and products stocks will increase about 80,000 bbl. daily next year. Since the stock drop this year will be near 140,000 bbl. daily, the shift in stock changes alone will call for a 1959 increase in new supply of 220,000 bbl. daily.

New oil needed to meet demand and stock requirements during the coming year thus will total 9,705,000 bbl. daily.

How this total is split between domestic and foreign oils depends on the import program for 1959.

If total imports are held to 1,600,000 bbl. daily, domestic production will average about 8,105,000 bbl. daily. Of this, production of gas liquids will move up to 870,000 bbl. daily and crude production will set a new record at 7,235,000 bbl. daily.

Refinery runs for 1959 will depend on many factors. They include: Demand increases, required additions to product stocks, gas-liquids production, product imports, and transfers. The most unpredictable is product imports.

Unless product imports reach runaway proportions, refinery runs will exceed 8,000,000 bbl. daily for 1959.

Runs topped 8,000,000 bbl. in the third quarter

of 1957 and the first quarter of 1958 but never have reached 8,000,000 for a full year. The closest was 7,937,000 bbl. daily in 1956, but 233,000 bbl. daily of that total went into storage.

Trends beyond 1959 . . . Gains in domestic demand for oil in the years ahead will be tied closely to gains in total energy use in this country.

This has not been quite true in the last 20 years because oil has made gains at the expense of coal. But oil can't continue to replace coal in the energy market indefinitely.

Since 1938, domestic oil demand has increased at an annual rate of almost 6%, a faster rate than gain in total energy requirements.

Past records also show these trends: Energy use in this country has grown faster than population. Population increases have been on a higher level since the end of World War II. The combination of bigger gains in population and increased per capita energy demands means a rapidly expanding market for total energy.

For at least the next 15 years, oil and gas will take the lion's share of these gains in total energy demand.

Domestic consumption of petroleum is expected to gain at the average rate of almost 3.6% a year through 1965.

Gas will grow at a faster rate than oil and is expected to show average gains of 5.5% a year for the 1957-65 period.

Because of pressures from high crude-productive capacity outside the United States, imports of crude and products will gain at a rate slightly higher than the demand growth pattern unless they are completely controlled.

The supply of gas liquids also will be influenced by the higher rate of gain expected for natural gas.

If these assumptions prove true, gains in crude production will be less than gains in domestic demand. Thus it is possible that gains in crude production for the 1957-65 period will average a little less than 3% a year.

Outlook for drilling . . . The drilling industry can expect substantial increases in the years ahead.

Higher production rates for both crude and natural gas will require a larger backlog of reserves for both of these fuels. This will mean increased drilling to supply the increasing demand and to build the reserves to back up this production.

In addition, there has been a very good correlation between the number of wells drilled and the real income from oil and gas (chart).

Real income from oil and gas will hit an all-time high next year, even larger than for 1956 when operators set a record of 58,160 wells.

Unless crude prices drop still lower over the next year, income from oil and gas in 1959 will be sufficient to support a drilling program of 57,000-58,000 wells. But, some of the income from oil and gas will be spent for exploration and development work outside the United States.

At worst, production rates indicate a need for at least 54,000 wells in 1959, and these same production rates will supply the capital required for such a drilling rate.

In 5 years expect

New cycle for U. S. oil discovery

Oil finders are reexamining old ideas, exploring new ones for a fresh approach.

THE OIL EXPLORATIONIST today lives like a mouse in a maze.

He's desperately trying to achieve some kind of new goal. But he's not quite sure of his approach.

There is every reason to believe, however, that he will find his way out of present frustrations; and within 5 years we may see a new cycle of discovery.

It has been a long time since any really new exploration tool or technique has appeared. And there is no assurance that one will appear within the next 5 years—at least nothing to compare in impact with the electrical log or the seismic instruments.

The only big hope is a subjective one, and it can originate only in the mind of the thinking explorer. New ideas—this is the answer, and this will be the key to a resurgence of domestic oil and gas exploration.

Techniques . . . Today a great deal of research and thought is being devoted to possible new techniques that may be applied to oil and gas exploration.

There is little left to be done in the refinement of the seismic tools, and these may be expected to become ever greater subjects of automation.

Surface geology, while still in use, can hardly be expected to come up with anything sensational, for most accessible areas have been well covered.

Subsurface geology will probably see a greater application as more wells are drilled in older areas. This classic method of exploration will never die.

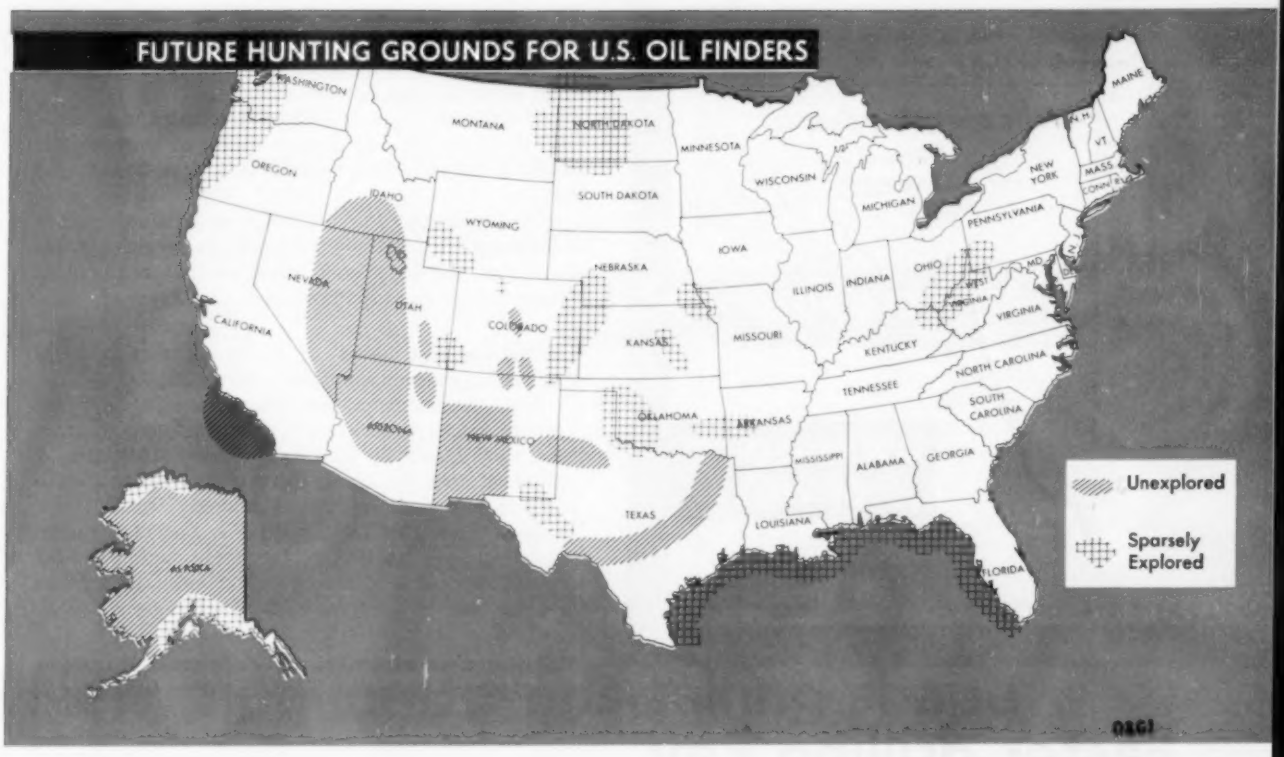
Are there, then, any really new techniques on the horizon? Leading geologists and geophysicists are inclined to say "No." But they do point to these possible refinements in older but unexploited techniques:

. . . Electrical profiling. This approach via electrical shock waves is actually older than the refraction seismic idea, but it was never fully exploited, largely because of the appearance of refraction geophysics.

. . . Geochemistry. Here is a possible new approach and if perfected, is the only technique which might possibly cause a revolution in exploration.

Nearly every major company today is engaged in some kind of geochemical research, and a few of them really believe that we will eventually be able to determine the existence of subsurface oil and gas through geochemical studies on the surface.

. . . "Early drilling." This is not a new idea, but one which is already beginning to appear in many places. In essence the idea is to move into an entirely new area and drill at random several "geological" wildcats —call them stratigraphic tests, if you will. In at least



one province, this approach has already paid off with three small oil fields.

. . . Temperature surveys. Some experimentation is going on now aimed at determining the effects of the presence of hydrocarbons on the temperature of the rocks at the surface, near the surface, and at depth.

. . . Sand studies. The more oil we find and the more studying that is applied to its occurrence underground, the more apparent it becomes that the obsession with structure which has afflicted geologists, geophysicists, and even the amateur oil finder, has probably retarded discovery more than anything else.

The subsurface geologist must learn to visualize the underground in his mind just as he sees the surface with his eye. Why should we imagine a perfect, fat, egg-shaped dome in the subsurface when we never see them on the surface?

Here is the real key to the oil fields of the future—the thinking subsurface geologist who will not be required to produce a beautiful structural contour in order to catch the eye of a banker or a promoter, but one who can visualize and put on paper what his mind sees from the subsurface data that comes across his desk.

Areas . . . Where shall we look for this oil of the future?

There are many places. As a starter, we might take a look at:

. . . New basins in New Mexico.

Watch for future developments in the Lucero basin, the Raton basin, and in the Otero basin.

. . . The tidelands.

Explorationists believe that the largest undiscovered oil fields in this country lie offshore. Some estimates of undiscovered oil reach as high as 20 billion barrels. So far only 1½ billion has been uncovered. The lapse in offshore drilling is purely an economic problem and not one of discouragement at all.

. . . The Great basin.

Here is the largest unexplored onshore region in our country. It stretches through southern Idaho, southeastern Oregon, eastern Nevada, western Utah, and northern Arizona. Only one oil field, at Eagle Springs, Nevada, has been discovered, but geologists believe that undiscovered oil lies beneath these western vistas.

. . . Rocky Mountains.

Here is a great active oil region leading the nation today in activity, and one that can be expected to lead it for the next 5 years. There is lots of room to play here, and a handful of almost totally unexplored basins.

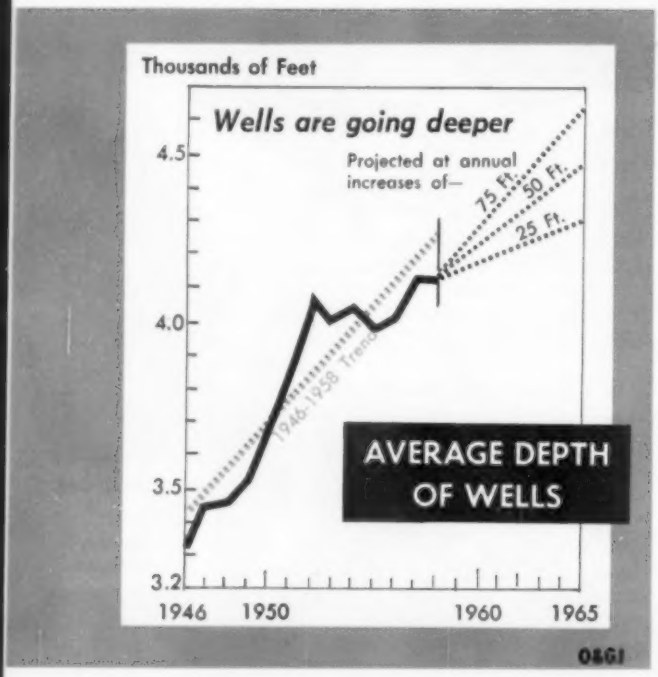
. . . Alaska.

More talk than oil so far—this is Alaska, a magic word in exploration today. But geologists are perfectly correct when they say that the new state has every requisite for major oil and gas fields.

The vertical approach. Deeper and deeper exploration can be expected in the future, especially in old established regions.

We are beginning to learn that oil and gas can and do exist in commercial quantities at depths up to 25,000 ft. The pioneering wells now under way are a harbinger of a new vertical approach to exploration.

Only the elephant fields will do and many a dry hole may be expected below 20,000 ft., but one good discovery in a major category will justify the sinking of these abysmal tests



Faster drilling key to cost saving

New-hole costs will remain steady despite general inflationary spiral

COST OF A FOOT OF HOLE may even come down in the next few years based on:

. . . **Drilling rates** getting faster. This may be achieved by higher bit weights, more use of air and gas drilling, and new drilling tools.

. . . **Rigs more portable.** More rigs, even in shallow-depth ranges, will use electric drive. Air-cooled engines and gas turbines will be tried as rig power.

. . . **Multiple completions** expanding. Many of these will use small-diameter strings run one at a time and cemented side by side in open hole.

. . . **Automation** on the drilling rig. Practical systems will be installed for making round trips automatically.

. . . **Underwater completions.** Wells will be completed on the ocean floor.

Weights on the rise . . . Bit weights have climbed to values unheard of only 2 or 3 years ago.

They should continue to rise because they generally pay off in faster drilling. Use of higher weights will be easier as we learn more about use of bit-bearing lubricants in the mud. Also, there is promise of a practical sealed-bearing bit getting into the field soon.

Just as in the past, water is the biggest obstacle for air or gas drilling. Today, we do have materials which make it possible to "live with" a moderate amount of water. But, when the volume is great, the water must be squeezed off.

The problem is not to find a squeeze material—several compounds are already tried and proven—but to find a way to get the material into place quickly and cheaply.

Most promising tool for this is an inflatable packer that runs in the drill-collar string during regular drilling. Using this, the water zone could be squeezed without pulling the bit from the bottom of the hole.

Fast drilling, fast moves . . . If drilling rates go up as predicted, rig moves will have to get faster, too.

Most manufacturers are already looking at better ways to package their equipment for quick moves. Also, they expect to be able to uprate much present equipment, thereby putting lighter, more-portable items into jobs now done by heavier models.

Most agree that electric drive is one of the most promising ways for making rigs more portable. And, engine-generator sets are becoming more competitive in price with straight mechanical drive.

Multiples more attractive . . . While multiple completions don't cut the cost of a foot of drilled hole, they do brighten the prospects for payout.

This factor alone makes them attractive. But, new developments in dual and triple completions will make them even better and cheaper.

One of the new techniques is the "tubingless" method. That is, the well is cased with pipe small enough that no tubing is needed. Moreover, several wells have already been completed with two or three of these small-diameter strings cemented side by side in open hole.

Offshore to revive . . . It won't be enough that cost of offshore wells stay where it is.

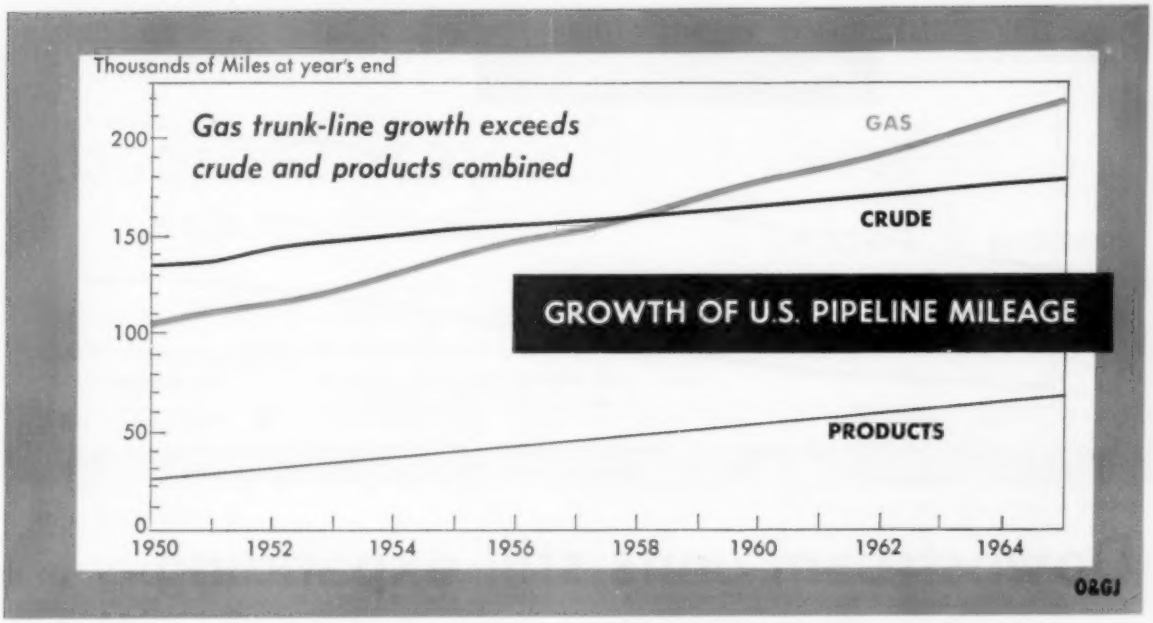
Little of our marine drilling has been economic; so, cost of offshore wells will have to come down.

Part of the cost reduction will be from improved drilling practices. Part will be in new methods such as underwater completion of the wells.

A method is almost certain to be perfected to make completions with the wellhead on the ocean floor. When it is, the expense of platforms can be cut. And, drilling from floating ships will be practical. Floating vessels are cheaper to build, simpler to operate, and not limited by water depth. With floating vessels and underwater completions, there would be little to prevent drilling and completing wells in waters more than 600 ft. deep.

Other changes, too . . . Besides the improvements outlined here, there are certain to be other big changes for drilling in the next 5 years.

Some might be these: Generally smaller hole sizes; wells with 15,000-psi. top-hole pressure; a 30,000-ft.-total-depth well; fluid-end parts to enable mud pumps to make long runs at pressures above 3,500 psi.; downhole motors economical in most drilling conditions; and heavy chemical muds containing no solids.



New pipeline trends taking shape

A CONTINUED HIGH if unspectacular level of pipeline construction will be required to meet growing petroleum transportation needs through 1965.

A Journal study indicates construction of 56,000 miles of gas-transmission lines, 20,000 miles of crude lines, and 22,000 miles of products lines during the 7-year period.

Several other important trends and developments are foreseen:

. . . **Introduction of 40-in. pipe** for high-pressure trunk lines, with the average diameter of trunk lines increasing, although less rapidly than during 1940-58.

. . . **Higher strength** thin-wall pipe of 60,000 psi. yield pressure.

. . . **Improved coatings**—with the possible acceptance of new plastic tapes or thin-film coatings—and the beginning of a trend to mill coating.

. . . **Wider use of automation** by gas as well as liquid lines.

. . . **Lower unit** transportation costs as a result of the above trends.

. . . **Pipeline movement** of LPG in larger volumes along with a variety of other commodities, including some chemicals.

. . . **Continued dominance of electric drives** on liquid lines, accompanied by the trend to still higher-speed internal-combustion engines and the entry of the gas turbine as a liquid prime mover.

. . . **Continued dominance of the gas engine** for gas transmission, with increased application of the centrifugal compressor driven primarily by the gas turbine and to a lesser degree by the gas engine and electric motor.

Big growth in sight . . . Pipeline capacity must be built to handle an additional 425 million barrel-miles of crude and products traffic and 640 billion cubic feet of natural gas per year by 1965.

There will be a demand for slightly more than 3,000,000 tons of line pipe a year, the same as the average for 1950-58 when shipments ranged from 2.2 million tons in 1954 to 4.2 million tons in 1957. The gas industry will take 80%, crude lines 12% and product lines 8%.

Products-pipeline movement is expected to more than double between 1956 and 1965, duplicating the 1950-56 increase. This includes larger volumes of natural-gas liquids in the products total.

More products lines also will be connected to air terminals with the coming of the jet age and its increased fuel needs.

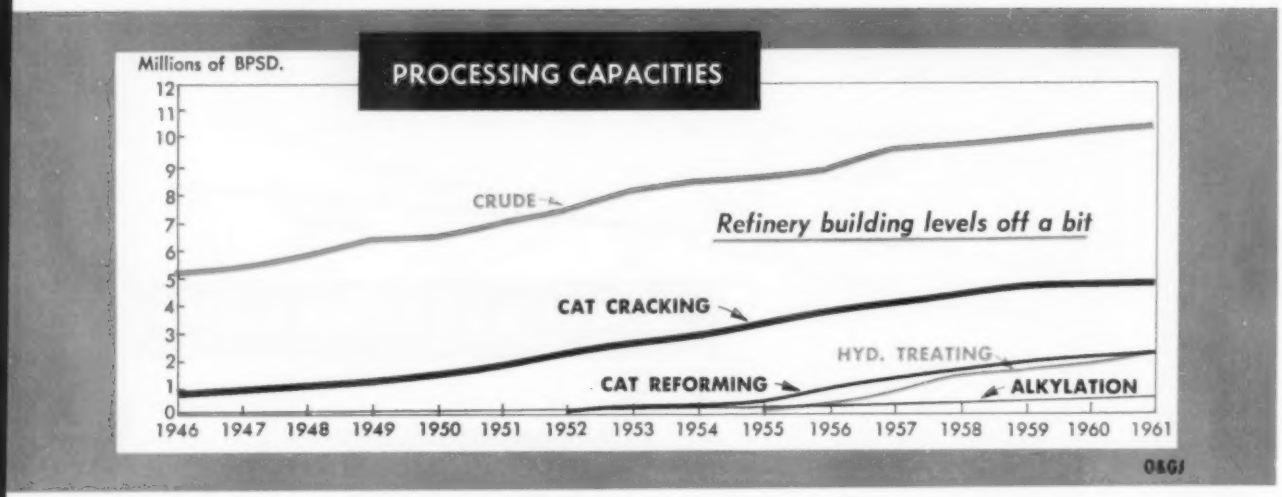
Outside influences . . . Actions of the courts and government agencies will affect all phases of pipelining.

If restrictions on Canadian crude imports are eased, big-inch crude lines will be built into the U. S. Midwest refining centers. Less products pipeline mileage will be required.

An increased flow of imports from the Middle East and Venezuela will have the opposite effect.

How much natural gas Canada is willing to export will affect construction, also. It now appears that this flow may not increase so rapidly as was expected.

The extent and method of federal control of prices paid to gas producers will have a bearing on availability of gas, and hence on construction. The trend is definitely toward sales where the Federal Power Commission can't fix the price. But interstate gas-line construction will continue on a large scale because that's where more than 55% of the market is.



Downstream units still expanding

A TIMELY LEVELING OFF is in prospect for refining capacity next year.

This drop in the rate of new construction of crude-processing units plus retirement of marginal facilities means that basic refining capacity will move more in line with actual runs to stills.

The latest tally of new construction projects indicates an increase of about 1.4% at most for new capacity next year. It could be less, if refiners continue to scrap older units.

Building of new crude units definitely has slowed. Projects stand at roughly half the backlog of a year ago. This slowdown should reverse the overbuilding trend which has continued with some government encouragement for the past several years.

Since 1951, U. S. refiners have seen a fairly steady decline in the relation of crude runs to total operable capacity. With the exception of 2 years, crude runs figured as a percentage of total capacity have declined from 93.5% in 1951 to less than 83% this year.

Next year a slight upturn is forecast. Crude runs should average better than 85% of projected operable capacity. This still will leave a "cushion" of nearly 1.5 million barrels per day of unused crude capacity. That should more than satisfy the Government's desire for some emergency margin.

If refiners again reach the level where they are operating at about 90% of their calendar-day capacity, tendency toward excess runs to stills will be lessened.

A boom downstream . . . While additions to basic crude capacity are falling more nearly in line with demand, other plant construction is still growing.

The need for higher product quality is supporting a continued building program for catalytic reforming, hydrogen treating, and alkylation. In all of these downstream processes, expansion is exceeding the growth of basic crude capacity.

Reforming is due to grow because a wider range of feed stocks is now being processed. Practically all new reformers are now coupled with hydrogen pretreaters. This practice admits more and more thermal gasoline as feed stock. In time, heavy catalytic gasoline will follow this same reprocessing trend. Total cat reforming capacity now averages very close to 20% of total crude capacity. It will go still higher.

Competition in distillate-fuel quality has become such that hydrodesulfurization is a "must" in many refineries. This growing employment for product finishing is superimposed on a steady rise in hydrotreating reformer feed stocks.

On still another front, hydrogen treating is gaining new emphasis. Some refiners have found that they can in effect expand their catalytic cracking capacity by hydrogen treating not only their cycle stocks, but their fresh feed as well.

Alkylation is still a minor process from the standpoint of total capacity. But it is the fastest growing today. Refiners both large and small are moving generally in the direction of alkylating all butylenes and more and more propylene. By 1961 total alkylation capacity in this country will have jumped over 40%.

The general acceptance of alkylation may postpone the day when refiners turn to isomerization of pentanes and heavier. Pentane and hexane isomerization is practiced today in a few refineries which have more than the normal amount of these light ends available for processing. This new process is coming, but more slowly. Isomerization gives less octane improvement per dollar invested than do reforming or alkylation.

Field processing . . . Production of gas liquids at field processing plants over the next 5 years calls for an increase amounting to 5% per year.

Natural-gasoline production will be less, but this will be more than offset by expected growth in LPG. Production of LPG and LRG next year should reach 9.1 billion gallons from an expected 8.9 billion gallons this year. It should continue a rate growth of 6% annually for the period 1959-61.

Absorber-tray effectiveness

. . . in recovery of propane

Despite its all-important bearing on gasoline-plant economics, the effectiveness of the absorber tray has been largely taken for granted by the industry. In contrast, data developed from the analyses of over 500 tests on 175 commercial absorbers clearly reveal wide differences in the tray effectiveness of currently operating columns.

BY EDWARD G. RAGATZ

THESE DIFFERENCES are of sufficient economic significance to warrant development of a standardized absorber-test method whereby the gasoline-plant operator can:

- Readily evaluate the performance of a particular column relative to the industry's most efficient units.
- Formulate adequate operating guarantees for the purchase of new equipment.

To be most effective, such a test-method should incorporate these features:

1. Be capable of ready use by the operating personnel of the average gasoline plant.
2. Require a minimum of test data of a nature readily obtained from the average column installation.
3. Eliminate any need for use of "personal judgment" in the analysis of said data.
4. Be largely independent of stream compositions, tray traffics, column pressures and temperatures, and number of trays employed.
5. Define the effectiveness of the column tray directly in terms of potential component recovery.

Conventional approach . . . Evaluation of absorber-tray effectiveness has focused on degree of "key-component" recovery—with the resultant tray-effectiveness evaluation being expressed in terms of a "tray efficiency" relating the actual number of trays employed to the theoretical minimum required to effect the same key-component recovery under comparable conditions of operation. For the absorber operation in particular, this theoretical approach presents serious difficulties.

Author is manager, Edward G. Ragatz Co. Paper presented at CNGA fall meeting, 1958.

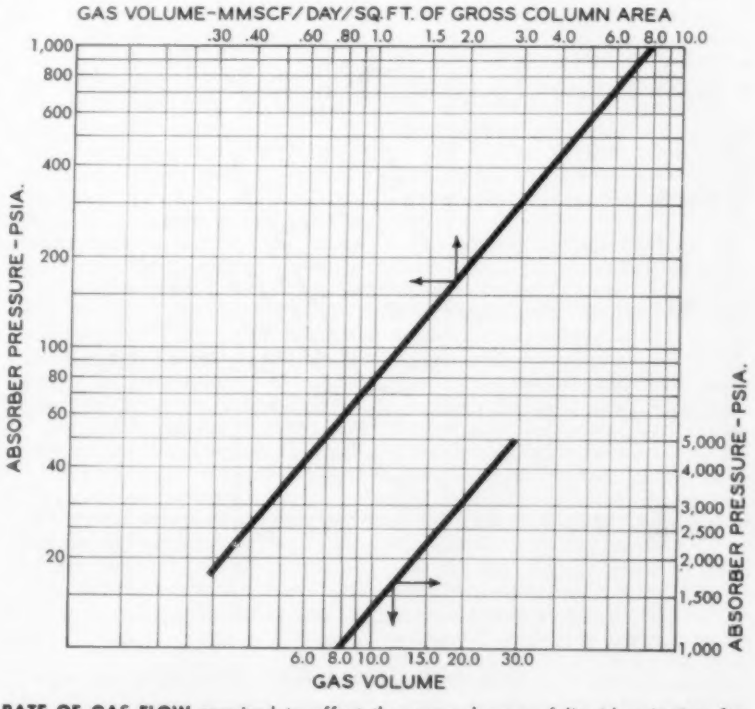
Rigorous paralleling of the actual column operation with a theoretical-trayed column is extremely laborious, and beyond the scope of most plant-operating personnel.

Some authorities have suggested simplified ways of approximating the rigorous analysis. Unfortunately, these approximations yield various efficiency values for the same actual column operation—leaving the operator at loss as to which method to employ.

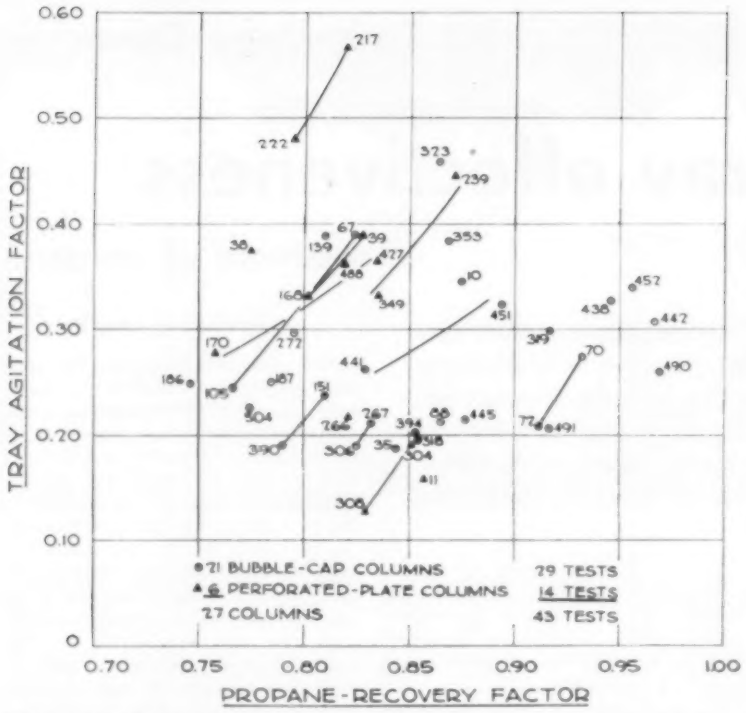
Having been given one of these various-derived efficiencies, the operator still lacks a clear-cut picture of how his particular column compares with the industry's best units in terms of realizable component recovery.

Experience factor . . . Availability of the new operating data has indicated the possibility of an "experience-factor" approach to the absorber-tray evaluation problem in contrast to the conventional theoretical-tray approach. This latter approach avoids the difficulties of the theoretical-tray analyses, and gives promise of affording the basis for a standardized absorber-test method meeting all of the previously outlined test requirements. In application, it focuses on propane at lighter-than-key recoveries of under 80%.

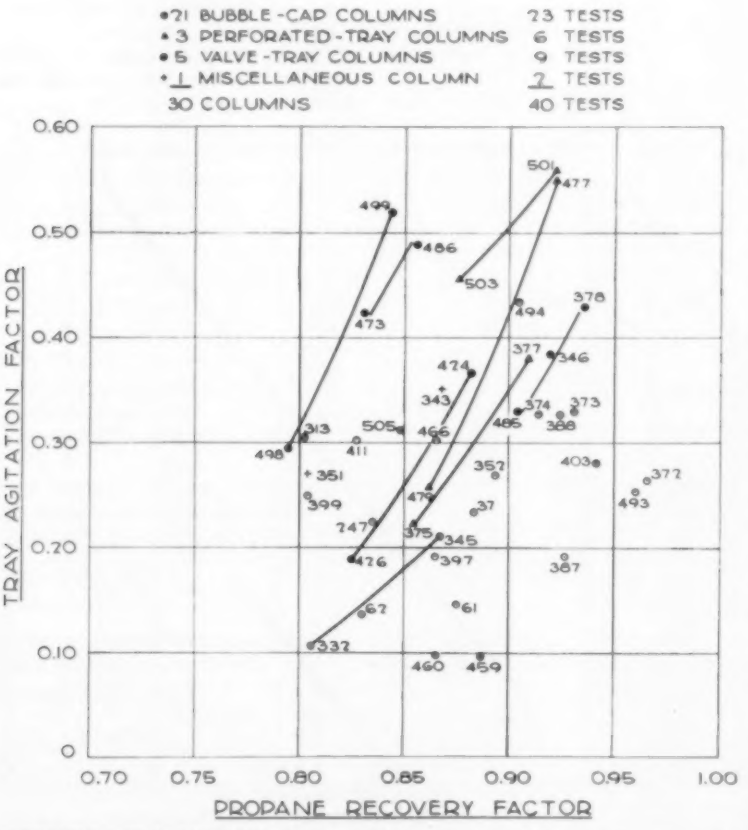
Focusing on a lighter-than-key recovery of propane rather than the usual key recovery of isobutane, has these advantages:



RATE OF GAS FLOW required to effect the same degree of liquid agitation for any given operating pressure. Fig. 1.



PROPANE-RECOVERY FACTORS, 350 to 600-psia. absorption, propane recoveries under 80%. Fig. 2.



PROPANE-RECOVERY FACTORS, 600 to 1,200-psia. absorption, propane recoveries under 80%. Fig. 3.

1. The precision of the analyses for the evaluating-component concentrations in the rich and lean-gas streams is materially enhanced due to the much higher concentrations of propane present in these streams.

2. The need for evaluating a mean absorption factor for the over-all column is eliminated, since only a relatively small number of the total trays normally employed can be effectively used for recovery of the lighter-than-key fractions.

3. With a very few (and readily recognized) exceptions, the environment controlling the final degree of lighter-than-key recovery is located in the bottom few trays of the absorber where the pressure, temperature, stream-quantities, and compositions controlling said final recovery can be readily ascertained.

For such lighter-than-key analyses, it appeared logical to investigate the applicability of a new ratio as a "first-order" evaluator of absorber-tray effectiveness:

The ratio of the actual propane content of the rich oil (giving full weight to any propane contained in the lean oil) to the propane which would be in the rich oil if the actual mols of rich oil were in equilibrium with the incoming rich gas at rich-oil temperature and column-base pressure.

While recognizing that, theoretically, this ratio should be on the basis of the gas leaving the bottom tray of the column, the rich gas entering the column was used due to the ease of accurately defining its propane content, and since the resultant evaluation "yard stick" was to be based on actual, rather than theoretical, column operations.

We have designated this ratio the propane-recovery factor.

Propane-recovery factors . . . These have been calculated for all available absorber tests of under 80% propane recovery—with the resultant development of recovery factors ranging in value from the order of 0.75 to 1.10.

To check the yard-stick validity of these factors, they have been plotted in turn against propane content of the rich gas, per cent propane recovery, ratio of lean oil to lean gas, rich-oil temperature, rich-oil temperature minus rich-gas temperature, gas velocity, and column pressure.

With variations in the propane-recovery factors for individual columns ignored, all the above parameters except column-pressure produced shotgun patterns of sufficient balance to eliminate the probability of any undue warping of the propane-recovery yard-stick with progressive changes in the parameter value.

In the case of column pressure, how-

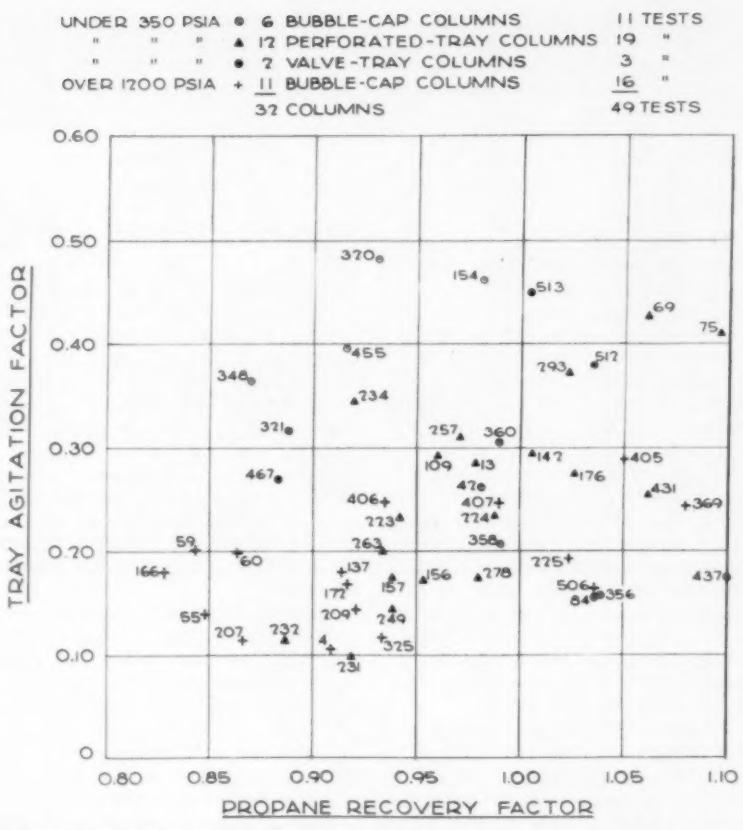
ever, there was an appreciable shift in the center of gravity of the shotgun patterns from a high at low pressure, to a minimum in the region of 500 psia., and then higher again as the pressure increased above some 500 psia.

However, the "spread" of the various-pressured test-points was of such character as to indicate that their noted differences could be adequately compensated for by grouping the test-data into pressure-ranges of under 350 psia., 350-600 psia., 600-1,200 psia., and over 1,200 psia.

With the absorber operation thus segregated pressurewise, and any other warping of the yardstick value of the propane-recovery factor largely discounted by said shotgun patterns, all data so far indicate that for first-order comparison purposes, the propane-recovery factor can be directly translated into percentage of realizable propane recovery.

If a given column is recovering 60% of propane with a propane-recovery factor of 0.80, raising the recovery factor to 0.95 by an increase in tray efficiency would increase the propane recovery to approximately $0.95/0.80 \times 60 = 71\%$ under otherwise identical conditions of operation.

Thus the propane-recovery factor offers promise of fully meeting all the previously defined requirements for an efficient tray effectiveness evaluator.



FROPANE-RECOVERY FACTORS, under 350 and over 1,200-psia. absorption, propane recoveries under 80%. Fig. 4.

Variations explained . . . When variations in the recovery factors for individual columns were focused on, well-defined changes in recovery factor with changes in column load at constant oil-gas ratio developed for the 350-600 and 600-1,200 psia. operations. In contrast, no such consistent change patterns for individual columns were shown by the available data on the lower and higher-pressured operations.

The noted effectiveness changes for individual columns within the 350-1,200-psia range were large enough to warrant special attention—and to adapt such changes to relative comparison within their designated pressure-range groups, we have resorted to a pressure-correlating factor.

This factor is the ratio of the actual gas velocity (expressed in terms of standard million cubic feet per day of rich-gas intake per square foot of gross column area) to a similarly expressed base gas velocity read off the curve of Fig. 1 for the operating pressure in question.

The curve of Fig. 1 presents the rate of gas flow required to effect the same degree of liquid agitation for any given operating pressure between 20 psia. and 5,000 psia. Hence any given value of the ratio represents the same degree of potential tray agitation, irrespective of the magnitude of the pressure in question. Fig. 1 was derived from a previously reported series of agitation-tube tests on three different absorption oils.

We have designated this pressure-correlating factor the tray agitation factor.

Figs. 2, 3, and 4 present plots of propane-recovery factor vs. tray agitation factor for operating pressure-ranges respectively of 350-600 psia., 600-1,200 psia., and under 350 psia., plus over 1,200 psia.—with the latter two ranges being consolidated for convenience of presentation. To avoid undue "weighting" by a few columns of the "point spreads" within each pressure-range, test points for any one column have been limited to two tests at any given oil-gas ratio.

The type of tray used has been indicated for the test points of Figs. 2, 3, and the "under-350-psia." points of Fig. 4, with the pressure category also being indicated for the test points of Fig. 4.

Effectiveness change . . . The character of the change in tray effectiveness associated with changes in tray load at constant oil-gas ratio for the 350-1,200-psia. range is indicated in Figs. 2 and 3 by light lines connecting pairs of test points for individual columns. These particular changes in tray effectiveness were due solely to changes in tray efficiency with changes in tray loading, since all other conditions of the tray operation were held substantially constant for each pair of tests.

Considering the number and consistency of these particular tray effectiveness changes, these absorber-recovery relationships for the 350-1,200-psia. operating range would appear fully proved:

- All of the presently used major tray types (i.e. bubble-cap, plain, perforated-plate and valve-plate) exhibit reduced tray effectiveness with reduced load at constant oil-gas ratio, and all exhibit the same average rate of reduction in propane recovery with said reduction in tray loading.
- At the average rates of such tray-effectiveness reductions, 5% of realizable propane-recovery is lost for each reduction in tray agitation factor of 0.12 units in the 350-600-psia. operating range, or 0.17 units in the 600-1,200-psia. range.

These load reductions for a 5%

loss in propane-recovery amount to only 25 to 30% of the load capacity of today's high-capacity columns—indicating the sizable losses in potential absorption-recovery which can accompany substantial underloading of currently operating absorbers in general, and today's high-capacity units in particular.

Other relationships . . . In addition to these reductions in individual tray effectiveness with reduced tray load, other general tray effectiveness relationships are revealed by the absorption-test data of Figs. 2, 3 and 4.

Well-defined differences in tray effectiveness corresponding to maximum differences of 15 to 20% in realizable propane recovery for the same general type of operation are exhibited by all four pressure groups.

In the 350-1,200-psia. operating range a substantial percentage of the bubble-cap tests fall in the maximum-effectiveness sections—with no bottom-entry trays approaching these effectivenesses in the 350-600-psia. range, and only the heaviest-loaded bottom-entry trays approaching them in the 600-1,200-psia. range.

Whether these noted differences in tray effectiveness are characteristic of the different tray-types, as such, or merely associated with the particular tests available, remains to be clarified by additional authoritative test data.

However, with respect to bubble-cap tray effectiveness in general in these ranges, we also find substantial numbers of tests on trays of the same design falling in the sections of lowest effectiveness—thus strongly indicating that the observed extra-high bubble-cap effectiveness were attained by chance rather than assured design.

No such effectiveness differences in tray types are indicated for the under-350-psia. operation where we have tests on both tray types, while similar comparisons are unavailable for the over-1,200-psia. range due to all tray types in this range being bubble cap.

There is no indication of any appreciable difference in the capacity, range, or effectiveness relationships of the various bottom-entry tray types, whether of value or plain perforated-plate design.

For the bottom-entry trays as a group, there is a definite indication of increased tray effectiveness with increased vapor load in the under-350-psia. range.

For the bottom-entry trays in particular, there is considerable indication of a reduction in tray effectiveness of individual trays with reduction in oil-gas ratio.

Finally, if the general patterns developed by the subject data are representative of the tray effectivenesses of current absorber-tray types (and we believe they are, considering the number and range of trays tested) tray-designers have a real "improvement goal" to shoot for, namely, a high-capacity tray-type that can be confidently designed to develop propane-recovery factors falling within the upper 20% of the subject test-patterns over at least 75% of its operating range.

Test procedure . . . It is recognized, of course, that the subject tray relationships are based on none-too-much data. However, we do believe sufficient tests are involved to establish the general pattern of the absorption-tray operation—with the numerical values of these relationships being subject to confirmation or some slight shifting with acquisition of additional authoritative test data. For acquisition of such authoritative data, we have found this absorber-test program most effective:

Thoroughly check the column meters for pen calibration and "clearness" of lead lines before and after the test period, noting that mere zeroing" of the meter is not enough—since gas meters are often inaccurate due to accumulation of condensate over the mercury or in one or both leadlines, while oil meters are notorious for collection of water in one of their lead lines.

Install the gas-sampling bombs so that full line pressure can be carried to the inlet valve of the bomb, with the sample drawn off the side of a tee-and-valve assembly whereby the sample line can be blown free of earlier sampled gas and superficial condensate before taking of each sample increment.

Take pertinent pressure, temperature, and volume-flow data over a 2-hour period of smooth operation, with sample increments taken every 10 minutes for 1 hour in the middle of the 2-hour period. If an appreciable surge occurs during any portion of the 2-hour period, discard the sample and start over, thus assuring against any surge-warping of the test results.

Take samples of the rich-gas, lean-gas and lean-oil streams only—omitting any sampling and subsequent analysis of the rich-oil stream.

Analyze the gas-stream samples with particular attention to accurate splitting of the propane-and-lighter fractions. Obviously, the new chromatographic units are particularly adapted to this analysis due to their speed.

Run a distillation and gravity on the lean-oil for calculation of its mol weight, together with a fractional analysis if presaturated (or contaminated) with any significant amounts of propane-and-lighter fractions.

Recalculate the meter coefficients for the actual gravities, pressures, and temperatures of the test streams.

Run at least three tests on the column, preferable at constant oil-gas ratio under three loadings as widely spread as convenient—or if a fixed volume of gas has to continue to be handled during the testing, at three different oil-gas ratios.

Assume the analyses of the gas and oil streams to be correct, and calculate one of the gas-streams from said analyses plus the volumes of lean-oil and second gas-stream on a "methane balance" basis. Assume the methane in the rich oil to be in equilibrium (at rich-oil temperature and column pressure) with the methane concentration in the incoming rich gas after correction for heavy end gas shrinkage across the bottom tray (this latter correction is of secondary importance).

When a metered volume is available on the second gas stream, the calculated value should check the metered value within 2 to 3% at most, providing an excellent check on the accuracy of the test. For some 40 of the subject tests for which we have metered values on both gas streams, the average deviation of the thus-calculated stream from its metered counterpart was only 0.22% (based on the latest NGAA K's) with just a few tests showing maximum deviations of the order of $\pm 3\%$.

Finally, check the three tests for consistency, discarding tests and continuing testing if necessary to obtain at least three tests consistent with the general operating pattern for the pressure-range in question.

Summary

The propane-recovery factor analysis for absorber-tray effectiveness is adaptable to ready use by average gasoline-plant personnel—particularly if a chromatographic analyzer is available.

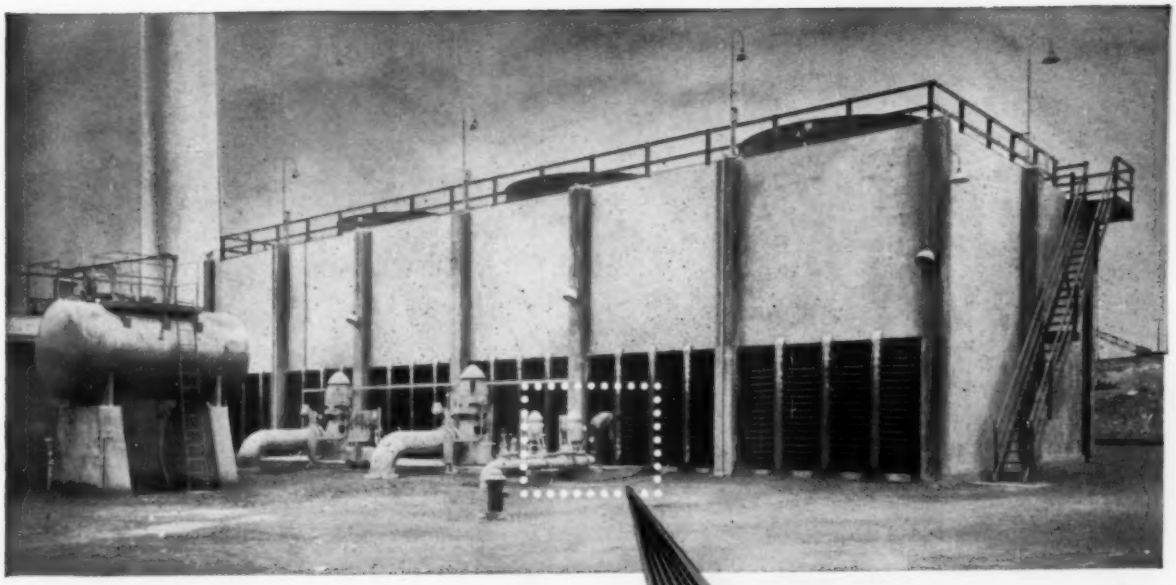
Data developed to date by this analysis reveal differences in the tray effectiveness of currently operating columns of major economic significance.

Given additional authoritative test data (possibly through industry cooperation via CNGA and/or NGAA) this analysis could form the basis for a standardized industry accepted absorber-test method.

NOTE: Copies of tables containing complete test data may be obtained from the author.

Reference

1. Ragatz & Baxter: "Vapor-Velocity Effects on Bottom-Entry Trays." The Oil and Gas Journal, April 16, 1956.



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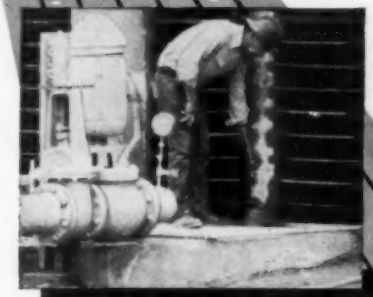
gets proven *Nalco* protection

This unusual cooling tower was built for the Riverside Cement Company at Oro Grande, California. The advanced design provides for concrete exterior walls which support and enclose fan units and redwood interior cooling vanes . . . The entire "working sections" of the tower can be repaired or replaced without affecting the structural strength of the shell. Nalco System Treatment protects this cooling system against scale and corrosion — has protected it effectively since it was first put in operation over two years ago. You can get the same complete water treatment protection, promptly, from Nalco. Write for details.



Method of feeding Nalco stabilizing treatment to this system is simplicity itself. Formula is supplied in ball form. Once each shift a perforated tube suspended in the tower basin is filled with balls which slowly dissolve in the cooling water.

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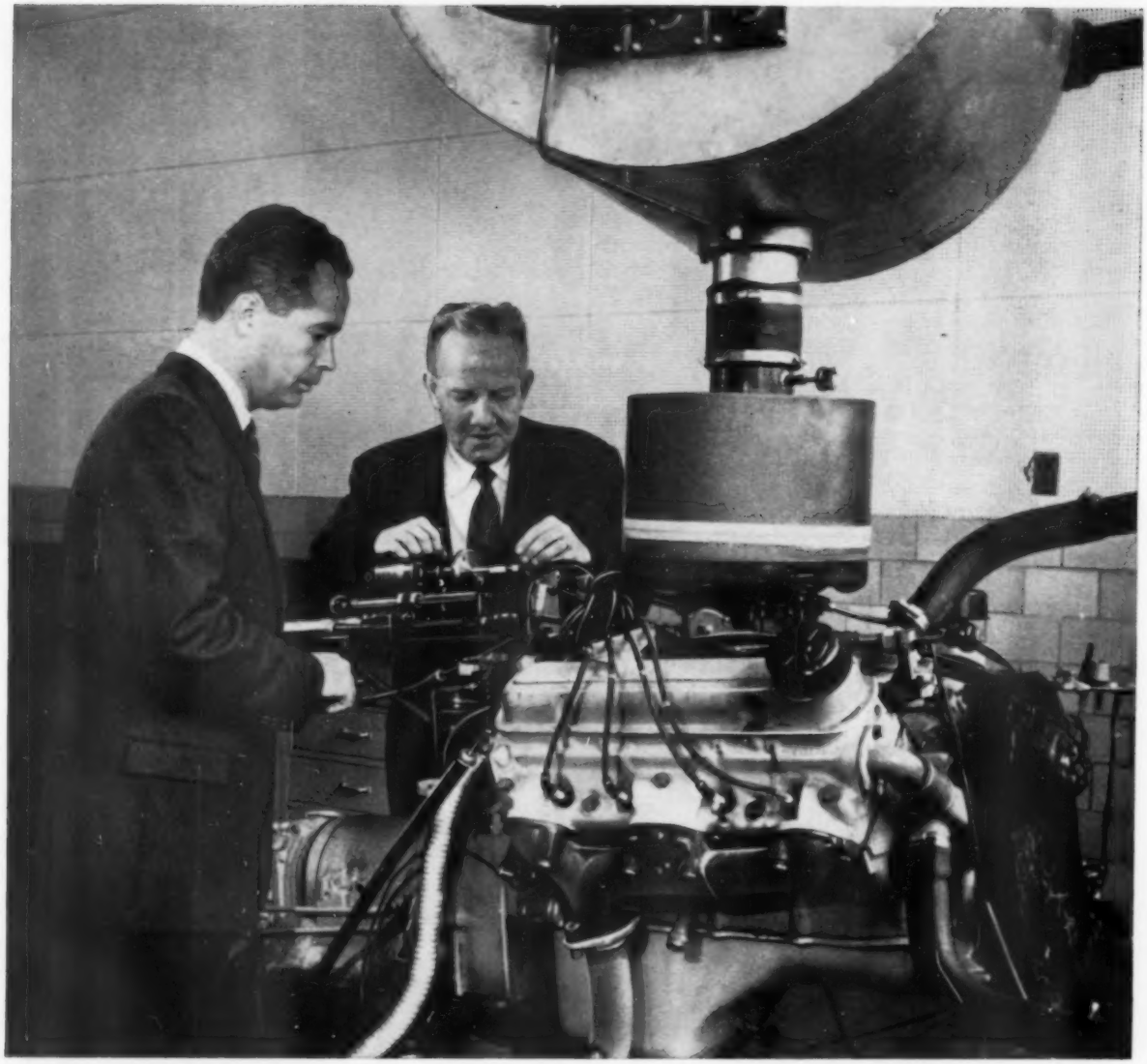


Ethyl Research helps you match gasolines to 1959 cars

By C. B. Kass and H. A. Toulmin, Ethyl Corporation Research Laboratories

ONCE AGAIN—for the fourth consecutive year—Ethyl Research Laboratories in Detroit have carefully estimated the octane requirements of 1959 U. S. automobile engines for the benefit of the Oil Industry.

Octane requirements of U. S. automobile engines have been compiled and expressed by graphs.

Separate curves have been plotted for trace knock—that point at which engine knock first becomes recognizable to the experienced technician; and light knock—the upper limit tolerated by the average driver.

Graphs show octane requirement range

A separate bulletin has been issued for each engine model included in the study. Data were made available to oil companies at the time of the introduction of the new-model cars.

Distribution curves in each bulletin show the percentage of 1959 automobiles satisfied at each point in the Research octane number range of today's commercial gasolines.

Predictions based on 35 years of experience

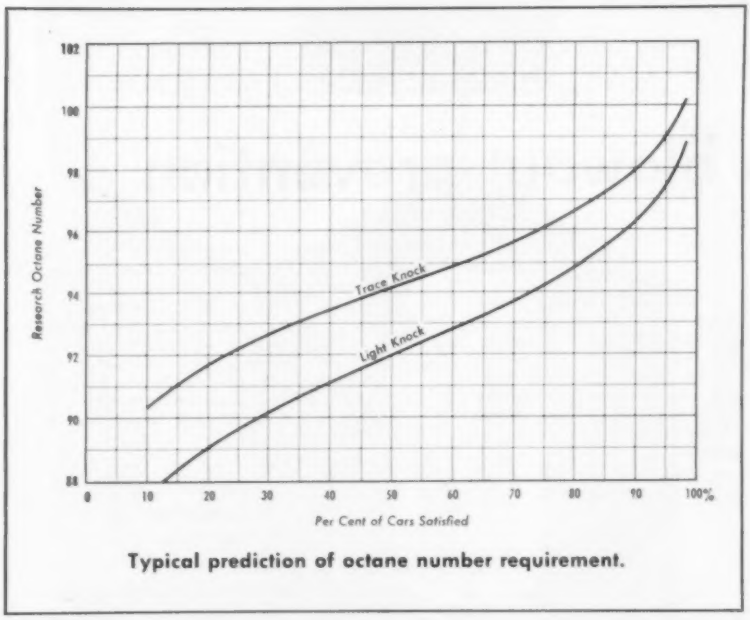
Ethyl engineers depended upon three factors in their study of 1959 engine octane needs:

1. Known octane requirements of predecessor engine models (established by Ethyl studies and studies made by the Petroleum and Automotive Industries).

2. Engine specifications for the 1959 models, supplied by the manufacturers.

3. Knowledge of the effect of engine design changes on octane requirement established by 35 years of study.

These predictions—made with considerable accuracy over the years—have proved helpful to oil companies in tailoring their fuels to satisfy the engine octane requirements of the new-car population.



Typical prediction of octane number requirement.

How Ethyl Research is helping you

The study described here is an example of Ethyl's continuous service to refiners by keeping them informed of the latest developments that affect the fuel-engine relationship.

Additional information on the fuel needs of past and present automobile engines can be found in the booklet "Octane Requirements of Past and Present U. S. Automobiles 1957 Supplement."

Copies of this booklet are available from your Ethyl Representative, or by writing Ethyl Corporation, 100 Park Ave., New York 17, N. Y.

•

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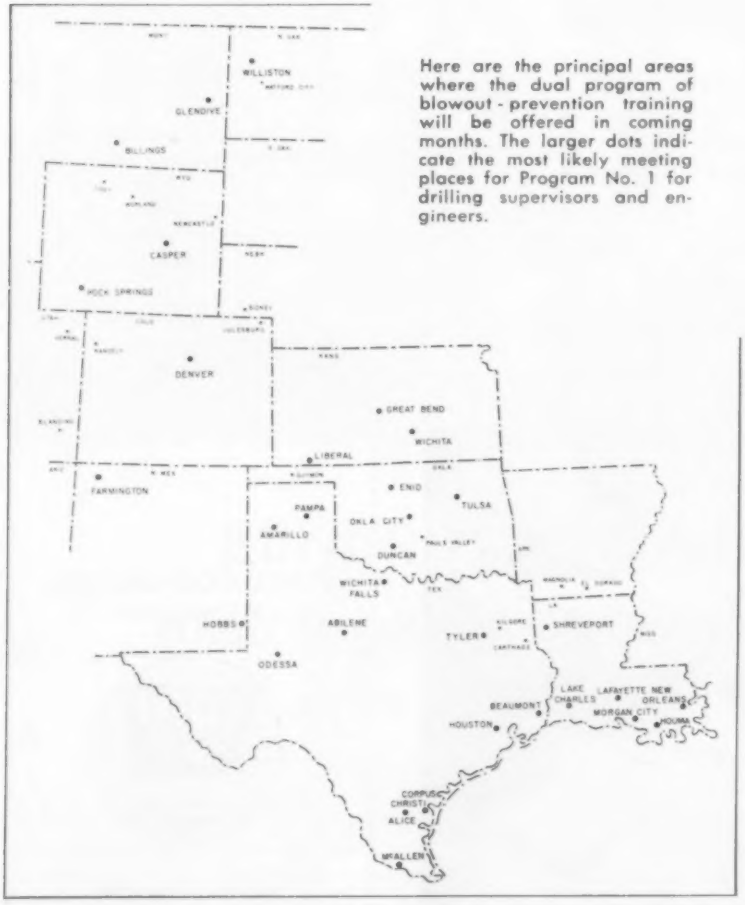
New course in blowout prevention



Here are the principal areas where the dual program of blowout-prevention training will be offered in coming months. The larger dots indicate the most likely meeting places for Program No. 1 for drilling supervisors and engineers.

In picture . . . Jim Atkinson, left, and Frank Bell demonstrate the relationship between drilling fluids and blowouts at the API-AAODC conference on blowouts at Lafayette, La., on September 23. Both are with Shell Oil Co. at New Orleans. Bell is author of "Drillers' Manual on High-Pressure Drilling and Blowout Prevention," published in The Oil and Gas Journal, October 14, 1957.

BY ED McGHEE
Drilling Editor

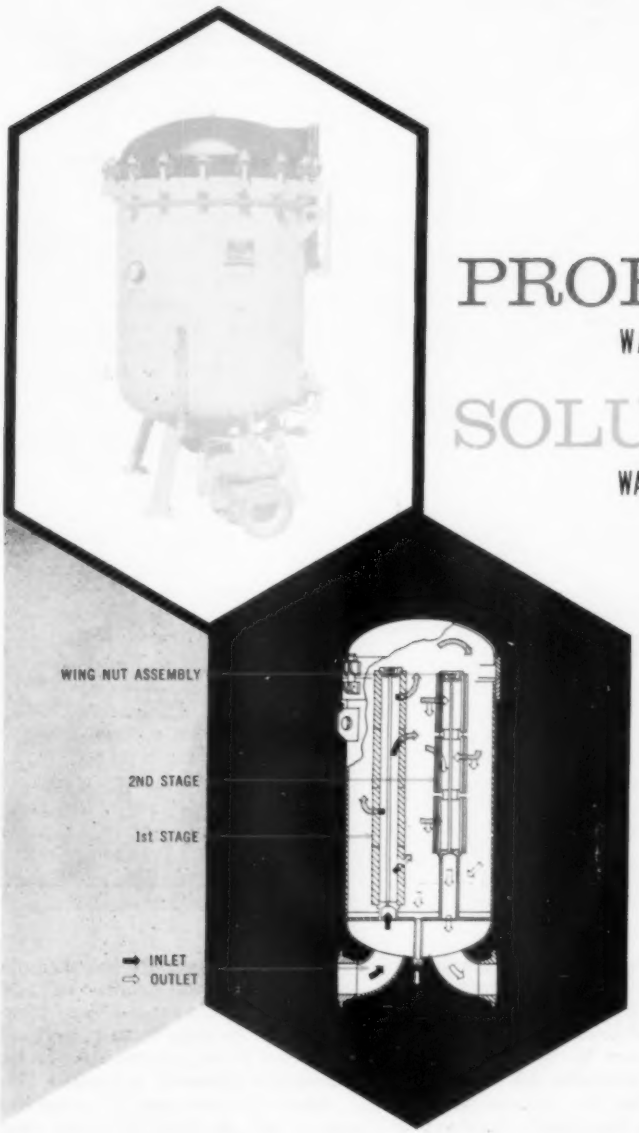
A NEW PROGRAM to train oil-well-drilling personnel in the prevention and control of blowouts is under way by the Petroleum Extension Service of University of Texas. Such a training course has been long needed.

This new course is the latest in a long line that have given most valuable instruction to oil-country people almost everywhere in the country. Prior to this, there have been popular and profitable Petex courses on drilling mud, handling of casing, handling of the drill string, and other practical subjects.

The new course on blowout prevention and control is being taken to the field like the others before it. First presentation of the complete course was in Lafayette, La., September 23-24, 1958. It was scheduled for Odessa, Tex., during October.

Plans call for sessions of the course to be held in the Rocky Mountains and

scheduled for 32 midstates centers



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SOLUTION:

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HOW IT WORKS

1st Stage — Coalescing-Filtering

Hydrocarbon and water enter inlet and pass through the coalescer cartridges where solids such as dirt, rust and scale are removed and mechanical emulsions are broken. Finely dispersed water droplets gather together into large water droplets and fall by gravity into the water-collecting sump.

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Clean hydrocarbon and any entrained water droplets flow to the separator cartridges. This chemically-treated media completely blocks the passage of water and clean hydrocarbon passes through the cartridges to the outlet.

Two stage design provides positive protection against contaminated products not possible in single stage designs.

Replacement cartridges feature high dirt holding capacity and low cost replacement.

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TABLE 1—OUTLINE FOR FIRST PHASE OF COURSE ON PREVENTION AND CONTROL OF BLOWOUTS AS PRESENTED TO SUPERVISORY PERSONNEL

First Day

1. Review of the causes of blowouts
   - 1.1 Effects of formation pressures
   - 1.2 Effects of formation fluids
   - 1.3 Faulty drilling practices
   - 1.4 Deficiencies in drilling fluids
2. Review of drilling-fluid control
   - 2.1 Properties and functions of drilling fluids
   - 2.2 Basic mud systems used in the area
   - 2.3 Methods of conditioning drilling fluids
   - 2.4 Special mud problems of the area
     - 2.41 Abnormal pressures
     - 2.42 Loss of returns
     - 2.43 Others
   - 2.5 Safety vs. rate of penetration

Second Day

3. Blowout control equipment and methods
   - 3.1 Basic requirements of preventers
   - 3.2 Types of preventers and their application
   - 3.3 Installation of preventer equipment
   - 3.4 Auxiliary equipment for preventer hookups
   - 3.5 Toward standardized hookups
   - 3.6 Special workover and completion operations
4. Cooperation in blowout control
   - 4.1 The responsibility of the operator
   - 4.2 The responsibility of the contractor
   - 4.3 The responsibility of the drilling supervisor
   - 4.4 Securing effective crew cooperation

TABLE 2

Outline for Second Phase of Course on Prevention and Control of Blowouts as Presented to Rig Crews

COURSE OF STUDY OUTLINE
(9 to 12 hours)

1. Definition of terms
2. How blowouts start
3. Early diagnosis
4. Aggravating factors:
   - 4.1 Low fluid level
   - 4.2 Low fluid density
   - 4.3 Faulty drilling techniques
   - 4.4 Others
5. Fundamentals of mud:
   - 5.1 Mud properties and functions
   - 5.2 Testing properties
   - 5.3 Fundamentals of treating mud
6. Area mud problems:
   - 6.1 Composition
   - 6.2 Treatments
7. Surface mud equipment
8. Mixing and storage
9. Types of preventers
10. Installation of preventers
11. Testing procedures
12. Maintaining preventers
13. Auxiliary control equipment

Williston basin areas during the coming winter.

The instructor's outline for the course, a comprehensive training manual, and two sound-and-color motion pictures were prepared under the cosponsorship of the American Association of Oilwell Drilling Contractors and the American Petroleum Institute. Frank J. Whitley, BBM Drilling Co., Houston, was chairman of the 44-man advisory committee that worked on the course for more than a year.

Individual firms or oil-industry organizations may arrange for local presentation of the course by addressing Petex at Box 8024, University Station, Austin 12. Or, they may address the AAODC at 505 North Ervay, Dallas.

To supervisors first . . . At the start, the seminar-type course will be given to superintendents, engineers, tool pushers, and in some cases drillers. Table 1 shows the outline for this course.

The program will last from 10:00 a.m. till 5:00 p.m. on each of two consecutive days. Instructors will be from the Petex staff; however, part of the instruction in these meetings will be given by two panels of industry experts who are familiar with the problems in the area where the meeting is being held. Emphasis will be on the planning of mud and casing programs, and preventer installation, testing, and maintenance.

Enrollment will be limited to 20 normally. Registration fee is $25 each and includes all printed matter.

Then the crews . . . The program will also be available for drilling crews. And, for their convenience, it will be offered in four 3-hour classes. Each class is to be held twice: before noon for evening-tour men; and in the early evening for daylight-tour men. Graveyard-tour men may attend either session.

Classes will be on 4 consecutive days, usually Monday through Thursday.

Table 2 gives the outline of the drilling-crew course. Notice that this course emphasizes maintaining adequate hydrostatic head to keep blowouts from starting. Second, emphasis is put on proper maintenance of the emergency preventer equipment.

Instructors for this phase of the course will be from the Petex staff. Enrollment will be limited to 20 normally. Registration fee is $15 each.

Where it will be held . . . Petex plans to hold the rig-crew program wherever there are 20 or more who will attend. Thus, a contractor should be able to give the course to his crews without their having to travel very far from their homes.

The program for supervisors can be offered mostly in the headquarters towns of the oil country. The map shows the 32 prospective centers in the nine most active midstates area. The blowout - prevention-and-control program will be presented in these cities as soon as arrangements can be made. It will be given in other cities if there are as many as 15 to enroll.

Case Report on "Craneloy 20" Gate at D-X Sunray Refinery

Best valve performance ever on toughest acid service . . .

. . . So says the D-X Sunray Oil Co. about this "Craneloy 20" gate on sludge draw-off at the big West Tulsa refinery.

Installed at the agitator bottom, this 6-inch Crane valve is handling various hot sulphuric acid sludge mixtures—concentrated and weak—steam-diluted to as low as 30%.

Valves used previously had to be replaced every 3 to 6 months. But this "Craneloy 20" gate went a full 14 months before minor repairs—then was put right back into service. It has the best record of any valve used on this toughest job in the refinery.

Specially developed for sulphuric acid at elevated temperatures, "Craneloy 20" is a high-nickel, high-chromium stainless. Teamed with Crane split-wedge, rotating-disc seating design, it makes a valve no corrosive fluid processor can afford to overlook for truly low-cost flow control.

GET FULL FACTS on "Craneloy 20" and other Crane quality alloy valves and fittings. Ask your Crane Representative for Circular AD-2080, or write to address below.

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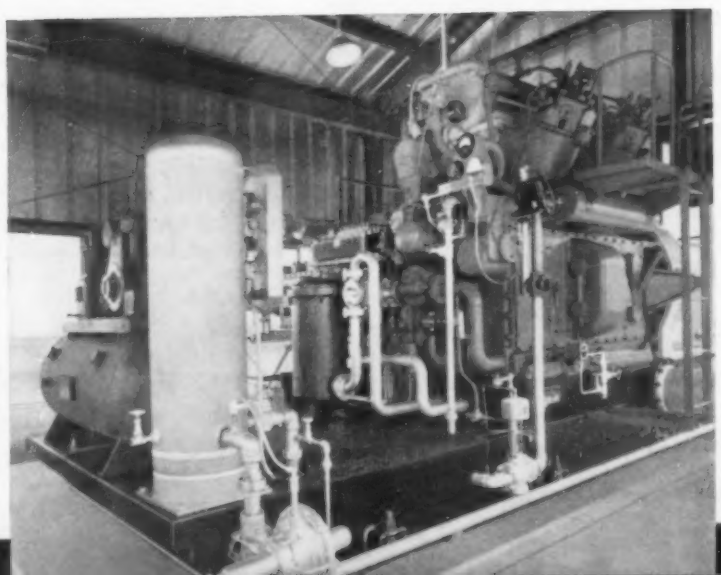

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FLEXIBILITY...
EXPANDABILITY...
PLUS ECONOMY--

features in gas injection services

For the Texas-Gulf Producing Company, operator of the Headlee Devonian Unit, packaged Cooper-Bessemer compressor plants handle gas injection into repressuring wells in the Odessa, Texas area.

Here are a few of the features that make GMXD compressors a natural for such services: Installations can be quickly and easily expanded if necessary. Packaging permits the addition of more units or larger units at the lowest possible cost. Interchangeability of spare parts reduces investment and inventory.

COMPRESSORS can easily be equipped with the necessary controls for unattended operation, requiring at most only periodic checking by one man. Delivery and installation are completed weeks ahead of non-packaged units. If requirements demand, extreme flexibility permits a change in location or a change in service at minimum expense and lost time.

COOPER-BESSEMER GMXD packaged V-angle compressors are individually designed and engineered for the job. Available in sizes from 265 to 660 horsepower. For further information write The Cooper-Bessemer Corporation, Mount Vernon, Ohio.

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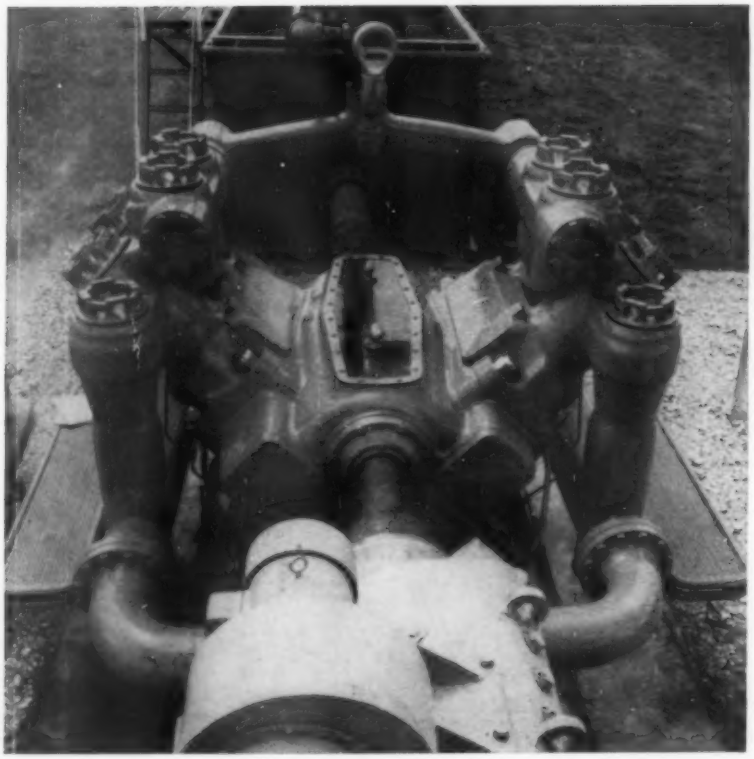

V-type mud pumps

–Here's how they were designed for greater drilling power

BY WILLIAM R. BARRY

FIRST OBJECTIVE in designing a "V" mud pump was to get higher operating speeds and pressures. Higher speeds of a pump should mean higher driving efficiency at a lower cost since bulk horsepower is proportional to speed. Higher pressures should permit faster drilling rates.

Several other features were also desirable: compactness, quality, producibility, reduction in number of parts, serviceability, and good looks.

To show the drilling industry the full possibilities of the V-type pump, it was decided that the pilot model should be of great horsepower. If the highest-horsepower model succeeded, then the smaller models would certainly fall in line. So, the pilot model was set at 1,500 hp.

This high-horsepower start greatly increased the engineering problem since, in general, fatigue is proportional to the fifth power of the loading, and compressive stresses (bearings) are proportional to the third power.

Greater input speed would help the user of the pump, but this also raises the dynamic loading in the pump gearing. Normally, a slush pump has jackshaft speeds between 300 and 400 r.p.m.; low-horsepower plunger pumps have jackshaft speeds of 600 to 700 r.p.m. So, a compromise was made on input speeds. The speed selected—600 to 700 r.p.m.—would satisfy the pump needs and, at the same time, keep down the dynamic loads on the gears.

Using aircraft gearing . . . Getting higher horsepower is a problem where the unit is to be compact, thus the best quality of aircraft gearing was used. For slush-pump use, however, there would be some differences for the aircraft-quality gearing: (1) Tooth loading showed large teeth would be necessary; (2) speeds would be lower than normal high-speed gearing; and (3) life expectancy should be longer.

To cut over-all bulk, two gear sets were used, one on each end of the jackshaft. To protect the gears, center distances were kept to the minimum. A split crankshaft eliminates the tooth-profile contact problem involved in double gearing. If this problem had not been solved, there would have been no advantage to precision gearing.

Four plungers . . . In developing a power end for the pump, it became apparent that there would be a better balance with a four-plunger arrangement. Also, there would be better flow of the pumped fluid than with a duplex pump. Still, the four plungers have a conventional duplex valving arrangement. There is some loss of flow characteristics from that with a three-plunger pump.

With the general arrangement fixed, compactness was the issue. And, if there is a single outstanding feature of the V-series pump, it is compactness. Compact arrangement is important for two reasons. First, to take advantage of hardened, precision aircraft gearing, design must be compact because of deflection (as well as manufacturing error) goes up directly with dimensions. Second, a compact design reduces cost and increases producibility.

Any weight saving would be a by-product benefit. However, a drastically lower weight would make the pump cheaper as the aircraft-quality castings range in cost from 57 to 85 cents per pound.

Fluid-end pressures . . . High-pressure operation of the pump would be a problem for the fluid end mostly. While there was a new approach on the power end, the fluid end was conventional.

It was not practical to use 100% aircraft-quality X-ray casings; they would cost too much. So a compromise was made. X-ray quality was used only in the pressure areas. Over 100 individual X-ray shots were taken

Author is associate consultant with Phil McLaughlin Interests, Dallas; he was formerly with Cardwell Manufacturing Co., Wichita. This article is a condensation of a paper titled, "Approach, Parameters, and Interpretation of the V-1500 Slush Pump," presented at the petroleum-mechanical conference of ASME, Denver, 1958.

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Metallic back-stop is now available in Closed Type Cages by use of 18-8 insert in upper part of rubber guide. Ball never touches this metal in normal pumping.

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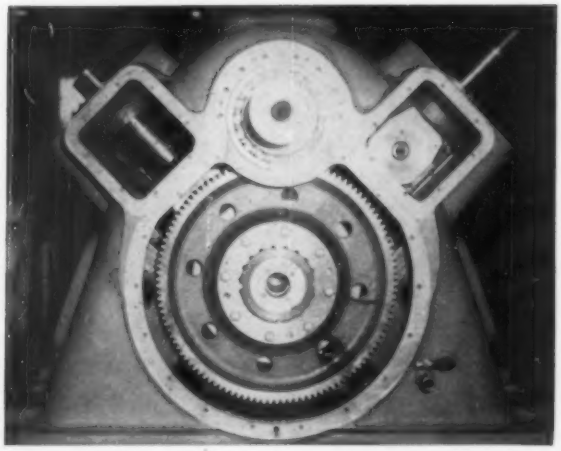
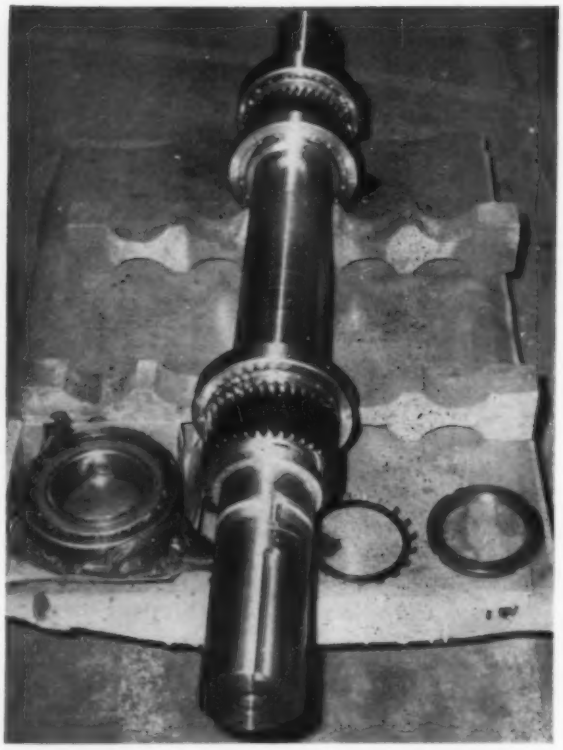


END VIEW of the V pump during assembly. The pinion shaft is at the top, the crankshaft below. The gearing is maximum-quality aircraft gearing.



PINION SHAFT of the V-type pump. There are two pinion gears driving the crankshaft. While this pinion shaft is in one piece, the crankshaft is in two pieces so that the gears will always mesh properly.

on each fluid head. This probably can be cut to 10 shots per casing in the future.

With the high-quality casings and a safety factor of 4, the pump should withstand pressure surges up to 10,000 psi. without failing. The casings were checked by static tests of 8,000 psi.

Valve life, suction pressure . . . Of course, there were problems in designing the fluid end. Two of these problems were valve life and pressure reductions in the suction. Actually, these problems are related. In valving, the lift was to be kept to a minimum. This was done by reducing the annulus above the valve and regulating the flow of fluid into the plunger area. Reason for this was to minimize the fluid flow over the top of the valve. This should reduce valve lift and improve valve seating.

Fatigue stresses are proportional to the fifth power of the dynamic loading. So, if dynamic loading is cut by cutting valve lift, the valves should last longer.

The arrangement of the V-pump placed the suction valve higher than on other types. This reduces the pressure in the suction. And, the problem would get worse as pump size increased. However, turbulence was kept down to prevent further lowering pressure in the suction. The pump suction was designed so that the pressure should remain above the vapor point of hot, aerated mud.

The packing problem . . . But, the major concern on the fluid side of the pump was packing. This problem was approached primarily as a structural and heat-dissipation problem. The original packing was designed to dissipate friction heat by individually lubricating each plunger with a pressure circulating system.

Having a packing of consistent quality is most important. Unfortunately, the methods used in packing manufacture do not, as a rule, lend themselves to a consistent quality-control setup.

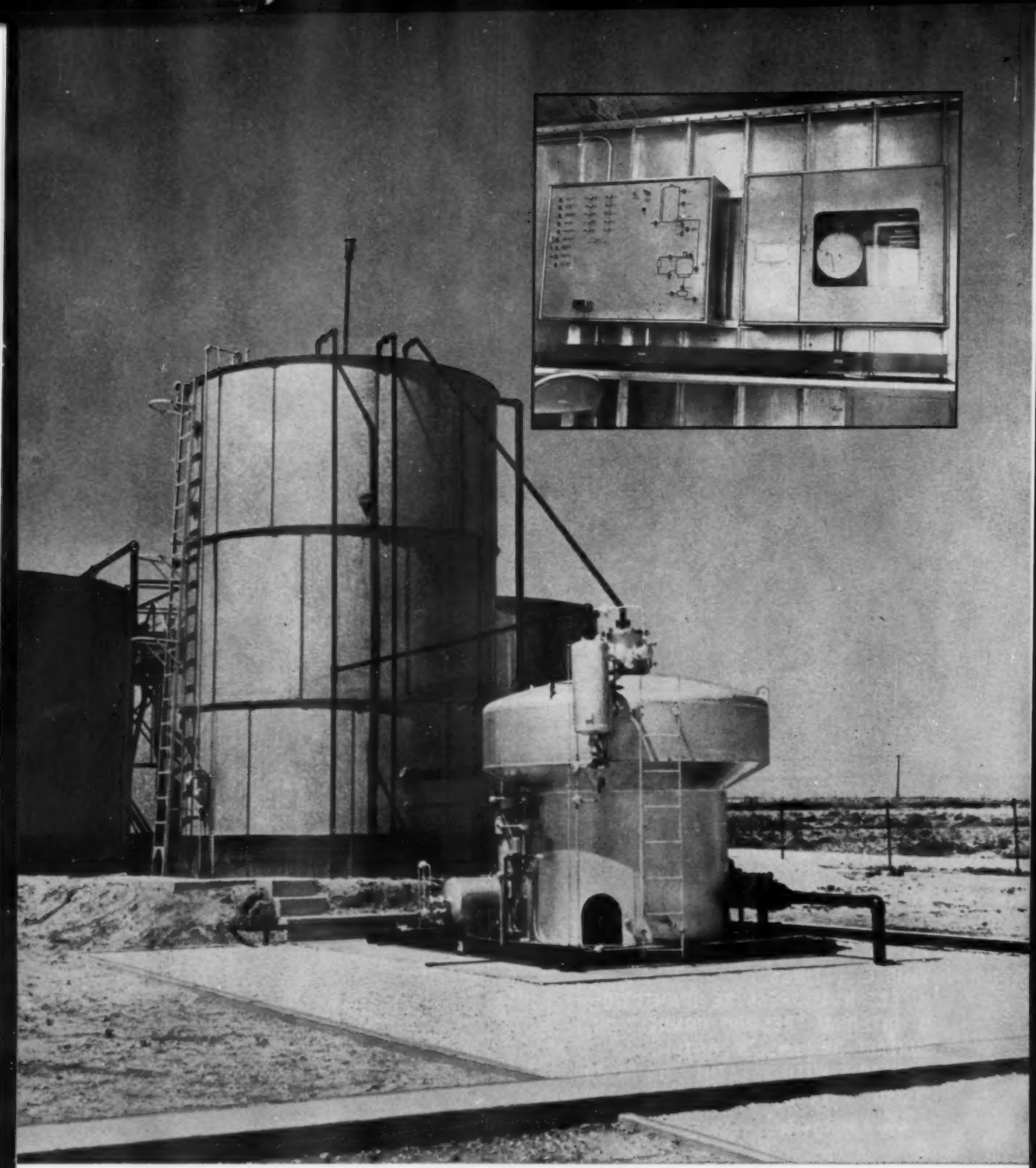
Results of field tests . . . At this writing, the pump had been tested for 1,000 hours. Six hundred hours of this was on two wells drilled in South Louisiana by Sun Oil Co. Drilling was to depths of 17,000 and 13,000 ft. When the first well (17,000 ft.) was completed, the pump was completely disassembled for close inspection. All mechanical parts showed negligible wear. There was evidence of the bearing outer races turning in their housings; these fits were adjusted to eliminate any turning.

There were packing problems; however, after modifications were made, the packing consistently had a life of more than 175 hours. With information now at hand, this life should be raised to more than 250 hours consistently at 1,500 hp. Packing in lower-horsepower pumps should show a great increase in life, as there is evidence that packing life is more than linearly proportioned to horsepower.

It became apparent that three main points govern packing life. These are lubrication, consistency in the quality of the packing material, and the method of construction of the packing. The problem of packing construction is one of how the fabric reinforcement is laid to firm the body. Causes of packing failure were insufficient lubrication and structural deterioration of the packing due to delamination. Few failures could be traced to lip failures.

Valve life seems to be as good or better than on conventional duplex pumps. This is true even though the V-type pump runs at three times the speed of the conventional pump under the same drilling conditions.

"It became apparent that three main points govern packing life. These are lubrication, consistency in the quality of the packing material, and the method of construction of the packing."



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EXPLOSION-PROOF CONTROL

by MERCOID

THE MERCOID CORPORATION, 4201 BELMONT AVE., CHICAGO 41, ILL.

Engineers have come up with some new methods for

Safe welding on gas-filled pipelines

BY J. S. POWELL AND H. M. CURTIS
Southern California Gas Co.

IF oxyacetylene cutting and electric-arc welding are employed on pipelines filled with combustible gas, gas must be free of air because of the possibility of an internal explosion. If air is introduced during any operation, the line must be purged with gas before cutting or welding is started.

During a cutting or welding operation, air is often prevented from entering the line at the joint by maintaining the gas pressure slightly above atmospheric and allowing the gas escaping through the joint to burn on the outside. This procedure is referred to as "controlled-fire welding." Another method that is used to provide safe working conditions during cutting or welding operations is to replace the gas in the pipe with a noncombustible.

Using the controlled-fire welding procedure on a 60-in. compressor suction line at Southern California Gas Co., several men were very severely burned when a mixture of air and gas within the line exploded.

It was thought that possibly this accident occurred either because purging was not thorough enough to remove all of the air or that air entered at the bottom of the joint while the welding was in progress. It was suspected that because of the large diameter of the line and the difference in gravity of air and gas that a negative pressure occurred at the bottom of the line even though a positive pressure was indicated by gas burning from the top.

Southern has been using this controlled-fire procedure on smaller-diameter lines for many years without an accident. Because of the accident on the 60-in. compressor line, it was felt that this procedure might not be safe for pipe as large as this. Therefore, the procedure was investigated to insure its safety for use on all sizes of pipe.

Presented before Pacific Coast Gas Association, Technical Section, Tuscon and San Diego, 1958.

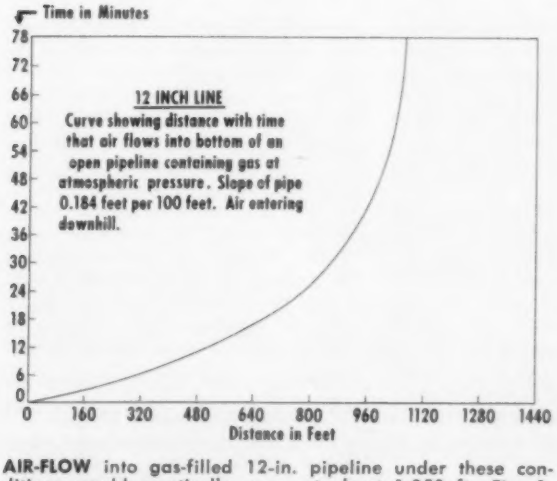
Safety Investigation

The investigation was directed toward finding answers to the following questions:

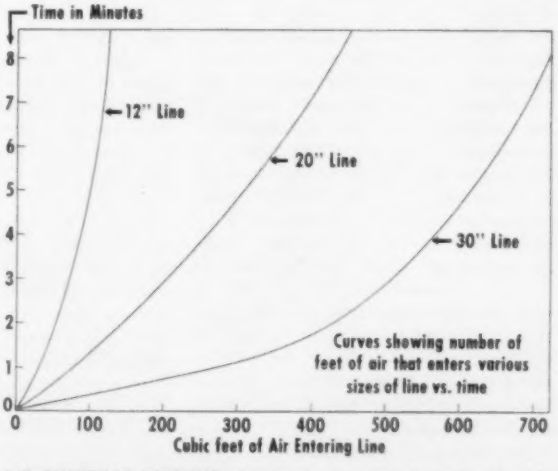
1. How rapidly and how much air enters the end of a pipeline opened to the atmosphere?
2. How should air be purged from a pipeline and its absence confirmed?
3. Does unconsumed oxygen enter a pipeline from a oxyacetylene torch during a cutting operation?
4. How much air enters a pipeline at a joint during cutting or welding using the controlled-fire procedure?
5. If the air entering a joint during controlled-fire welding mixes with gas and an explosion results, what condition is the welder exposed to?
6. What means should be used to prevent air from entering a joint during controlled-fire welding and cutting?

Test results can be summarized as follows:

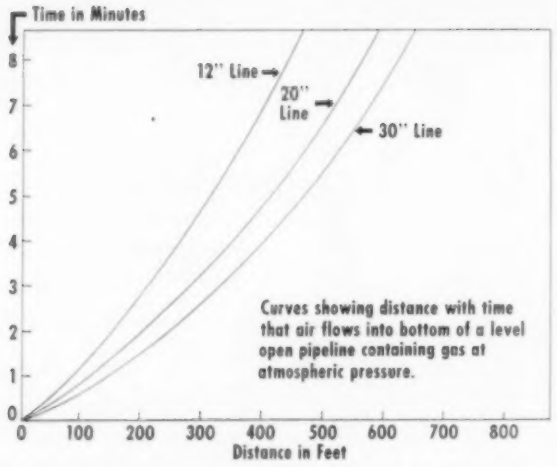
1. If a gas-filled pipeline is opened to the atmosphere, air runs into the pipe very rapidly. During a tie-in operation, even momentary opening of the line will allow enough air to run in to be hazardous if welding is done. Therefore, the air should be purged out with gas before welding is undertaken.
2. The practice of "drifting gas" out of an open-end large-diameter pipeline to prevent air from entering is not effective. It requires a flow of gas much larger than would be safe to discharge.
3. Because air running into a gas-filled pipeline flows and stratifies along the bottom of the pipe, it can be most effectively purged with gas through a bottom opening. It is essential to be sure that air is absent after purging by testing a gas sample taken from the bottom of the pipe.
4. Cutting into a gas-filled pipe with an oxyacetylene torch does not inject unconsumed oxygen into the pipe from the torch.
5. In controlled fire cutting or welding on large pipe, the size of the flame burning from the joint required to keep out air is too large for the welder to work near. The amount of air that enters the joint with a flame



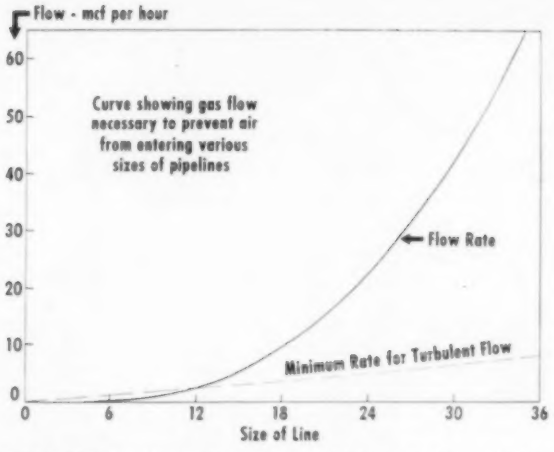
AIR-FLOW into gas-filled 12-in. pipeline under these conditions would practically cease at about 1,050 ft. Fig. 1.



AIR ENTERING PIPELINE during tie-in operations is sharply governed by size of pipeline being welded. Fig. 2.


Time in Minutes
12" Line
20" Line
30" Line
Curves showing distance with time that air flows into bottom of a level open pipeline containing gas at atmospheric pressure.
Distance in Feet

SPEED OF AIR flowing into bottom of pipeline is rapid, increasing with pipe size. Fig. 3.


Flow - mcf per hour
Curve showing gas flow necessary to prevent air from entering various sizes of pipelines
Flow Rate
Minimum Rate for Turbulent Flow
Size of Line

GAS FLOW for large pipe sizes would have to be excessively large to keep out air during tie-in operations. Fig. 4.

of tolerable height, if mixed with gas and exploded in the pipe, could cause serious burning of the welder.

6. In order to keep air out of a pipe, using the controlled-fire cutting or welding procedure, it is essential in the case of cutting to progressively "mud" behind the cut as it is made and in the case of welding to tape the joint, burning off the tape as the weld is made.

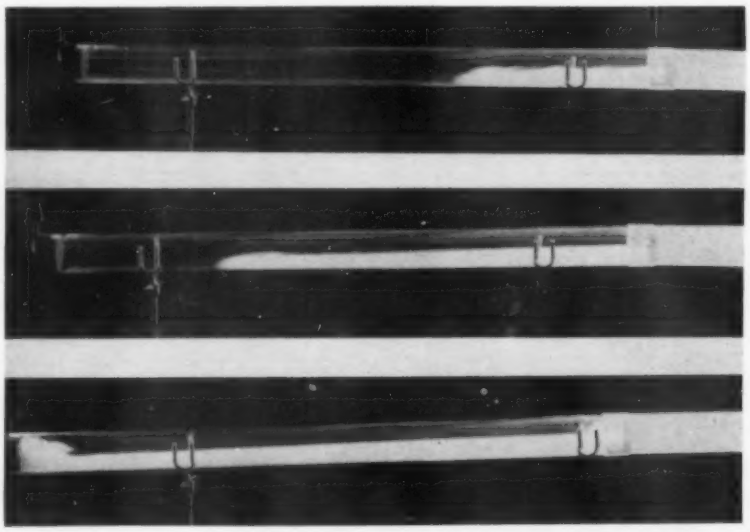
Air Entering an Open Pipeline

The distance that air will run into a long horizontal line or line sloping downward from the open end is mainly a function of the diameter of the pipe, the difference in gravity of the air and gas, and the degree of line slope. The distance will increase with diameter, difference in gravity, and degree of slope.

One test was made to determine how far air would flow into a gas-filled 12-in. pipeline. The test section was 812 ft. long and had a slope of 0.184 ft. per 100 ft. with the open end high. The results are graphed in Fig. 1. The section was not long enough to complete the test and the air reached the closed end. However, the rate that the air was moving when it reached the end was very low and the curve in Fig. 1 is extrapolated to show that the flow would have practically ceased at about 1,050 ft.

Another test was made with a 102-ft. section of 12-in. line elevated to a slope of about 1.75 ft. per 100 ft. with the open end low. In this case the air flowed to a point where the difference in elevation of the line at this point and bottom of the open end was equal approximately to the diameter of the pipe.

In cutting into a pipeline to make a tie-in, it is of interest to know how much air enters the line during the short time it is open to the atmosphere during the tie-in operations. Experimentally this was determined for pipelines of various diameters as a function of the time the pipe was open. In these tests the pipe sections were horizontal and the gravity of the gas was 0.650.



AIR-FLOW SPEED is indicated by entry of smoke-laden air into a gas-filled tube, after approximately half a second (top) and a full second (center). At bottom, air builds up against dead end after reaching end of line. Fig. 5.

Fig. 2 is a graph of the results obtained. Fig. 3 is a graph showing how far the air entered the pipe section as a function of time. These curves show that air enters an open line very rapidly, the rate increasing as the diameter of the pipe increases. The significance of this is that even with the utmost care in making a tie-in, where the line is only open momentarily, a hazardous volume of air will enter the line.

It is sometimes customary to maintain a flow of gas from the open ends of a pipeline when it is opened to the atmosphere to make a tie-in. The object in this case is to prevent air from entering the line. Tests were conducted to determine what the gas-flow rates would have to be to keep air from entering various sizes of pipe. Fig. 4 is a graph showing the results obtained. Except for pipe sizes under 12 in., the flow of gas required is too large to be safely discharged, and it can be concluded that for large-diameter pipelines the practice of drifting gas to keep out air is not practical.

Purging Air From a Pipeline

From what has been said before, it is apparent that during a tie-in operation even with care air will rapidly

enter an open pipeline. It is, therefore, necessary before any welding is done to purge out this air and check for its absence by a reliable test.

Air entering an open pipeline flows along the bottom in a wedge shape and occupies approximately 35% of the volume of the line to the point it has reached. Fig. 5 illustrates this condition, showing smoke-laden air flowing into an open glass tube filled with gas. Therefore, when possible, air should be purged from a bottom opening. The presence of air should always be tested for at the bottom of the pipe.

Fig. 6 shows the results of both bottom and top testing on a typical line completely filled with air at the start. In this case tests at the top would indicate the line was air free in about 5 minutes, when actually it would not be completely air free for about 10 minutes (shown by the curve for bottom testing).

During a tie-in, the amount of air entering the pipe can be minimized by the following procedures:

1. All new sections which are to be tied in should be previously purged of air, filled with gas, and capped.

2. When a pipe is to be opened to the atmosphere, the open end should immediately be covered by some appropriate closure.

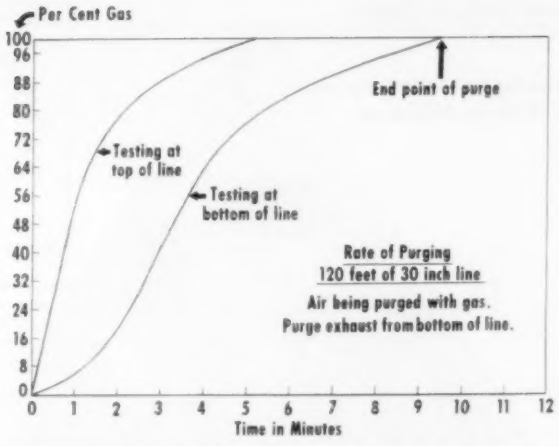
3. All cuts or open joints in the pipe should be mudded or taped as soon as they are made.

The air which still gets into the pipe by observing the above practices should be purged before any welding is done. This can be most effectively accomplished by purging to a final joint where both ends of the pipe are covered with a plate or canvas. By opening the covering at the bottom of the pipe, the air at the bottom can be displaced by "drifting in" gas, from either direction.

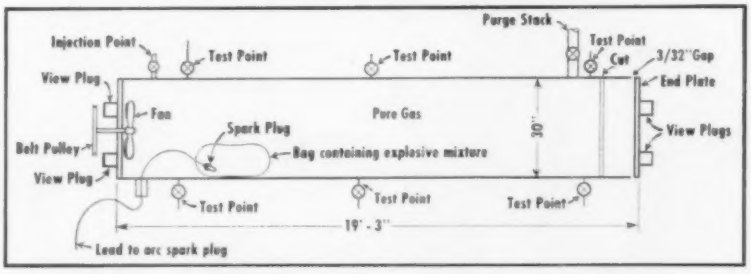
Confirmation of the completeness of purging should be determined by testing the issuing gas from the bottom of the pipe with a reliable combustible gas indicator or suitable gravitometer. The instrument used should show essentially 100% gas.

Air Entering a Pipe During Cutting or Welding

A series of tests was made to determine if air would enter a pipeline during the operations below:



PURGING OF AIR WITH GAS clears the top of the line in about half the time it takes to clear the bottom. Fig. 6.



TEST SECTION is 19 ft. long and 30 in. in diameter, with ends closed and a fan placed in one end. Fig. 7.

1. **Oxyacetylene cutting of a pipe containing air-free natural gas.** No effort was made to seal the cut as it was made. However, as large a flame as the welder could work near was allowed to burn from the cut. After the cut was made, it was taped.

2. **Butt-welding of two sections of pipe.** The joint to be welded was first taped and the pipe filled with air-free gas. The tape was removed from the joint, at the same time maintaining a flame burning from the joint as large as the welder could work near. The joint was then welded.

3. **The same test was made as in No. 2 except that a wedding-band type of joint was made.**

In these tests a 19-ft. length of 30-in. pipe was used. The ends were closed and a fan was used to mix the gases in the pipe to obtain a uniform mixture. Fig. 7 shows this test section. After completion of the above operations, any air getting to the pipe was mixed thoroughly with the gas. Samples of the gas mixture were taken and analyzed for oxygen and the volumes of air entering the pipe calculated. The results obtained are given below:

Operation	Cu. ft. of air entering pipe
Cutting	19
Welding Butt Joint	8
Welding Wedding-Band Joint	12

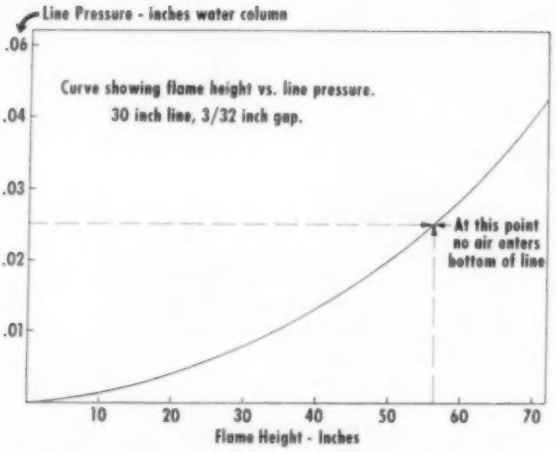
It is probable that in performing the above operations the volumes of air entering a pipe would increase with pipe diameter.

With fire burning from a joint, gas pressures were measured inside the pipe at the top and bottom. It was found that with a flame as large as a welder could work near, the pressure was about 0.01 in. of water column at the top of the pipe and below atmospheric at the bottom.

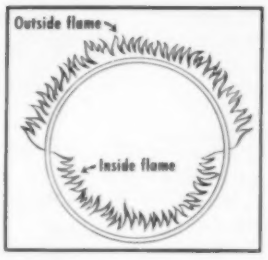
In order to have a positive pressure at both the bottom and top of the pipe, it was necessary to have a pressure greater than 0.02 in. of water column at the top. This gave a flame much larger than a welder could work near. Fig. 8 shows flame height versus line pressure in a 30-in. line.

Figs. 9 and 10 show the flame

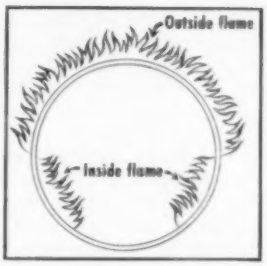
"Confirmation of the completeness of purging should be determined by testing the issuing gas from the bottom of the pipe with a reliable combustible-gas indicator or suitable gravitometer. The instrument used should show essentially 100% gas."



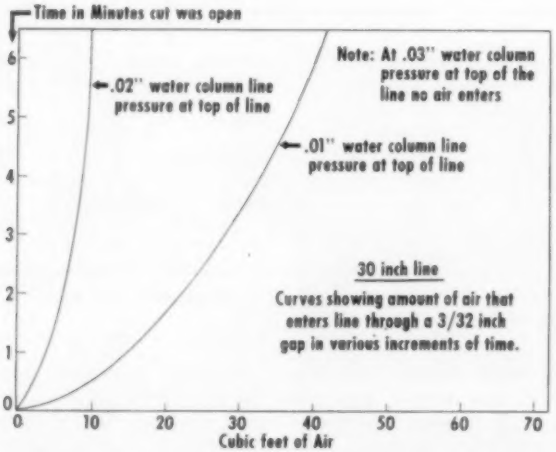
FLAME HEIGHT vs. line pressure in a 30-in. line. Fig. 8.



ALL AIR is consumed by inside and outside flames when pressure is sufficient to keep air from entering at the bottom. Fig. 9.



SOME AIR is unburned by inside and outside flames when pressure is not enough to keep air from entering at the bottom. Fig. 10.



AMOUNT OF AIR entering 3/32-in. gap increased sharply at change of line pressure. Fig. 11.

conditions observed where the pressures within the pipe are not sufficient to keep air from entering at the bottom. Fig. 9 shows a flame burning inside the pipe consuming all of the air entering. Fig. 10 shows two flames burning inside the pipe on either side of a section of the joint where air is entering in too large a quantity to be burned.

It can be concluded that if flames are observed burning outside the bottom of the pipe no air is entering the pipe. However, if the flame is not burning at the bottom, air is entering the pipe and may or may not be burned on the inside.

Another test was made using the same test section with a butt joint having a 3/32-in. gap. This joint was left open to the air for various lengths of time with various gas pressures in the section at the top of the joint. The results of this test are graphed in Fig. 11.

Air-Gas Mixtures

It has been shown that a considerable quantity of air can enter a pipe during controlled-fire cutting or welding. What happens if this air mixes with gas to form an explosive mixture and the mixture is ignited? To answer this question, a series of explosions was set off in a 20-ft. section of 30-in. pipe.

The section was provided with a simulated butt joint with about a 3/32-in. gap. The gas and air to be exploded in the pipe was mixed in a large plastic bag. A spark plug was placed in the bag to ignite the mixture. The plastic bag was inserted in the pipe, and the pipe filled with an air-free gas. Sufficient gas pressure was maintained inside the pipe so that air could not enter at the joint. The gas discharged from the joint was burned.

The tests were started using 5 cu. ft. of gas-air mixture despite the fact shown previously that as much as 19 cu. ft. of air entered a pipe during controlled-fire cutting. The explosion in this case produced a huge, massive, rolling flame in the vicinity of the joint which completely engulfed a wooden dummy welder.

The explosion produced an instantaneous pressure inside the pipe of about 2 psig. It was obvious from the scorching of the coveralls on the dummy that a welder working under these conditions would have been severely burned. The test section was above ground so the flames were not confined; under typical conditions with the welder in a bell hole the situation would probably have been even worse.

The severity of the explosion using 5 cu. ft. of gas-air mixture precluded the use of larger amounts, but several tests were made using lesser amounts of air. Even 1 cu. ft. of gas-air mixture produced a very hazardous condition.

The short test section used in the above tests may have intensified the explosive effect. In a long line an explosion may not produce as high a pressure to force gas through the joint because of the freedom of the gas to expand. In this case possibly the welder would not be subjected to as hazardous a condition. It would be desirable to investigate the explosive effect in a long line.

"It can be concluded that if flames are observed burning outside the bottom of the pipe no air is entering the pipe. However, if the flame is not burning at the bottom, air is entering the pipe and may or may not be burned on the inside."

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1. Smaller hole diameters

2. Multiple completions

3. Unitized production facilities

ALTHOUGH AVERAGE U. S. producing rate over the past 20 years is only 12 bbl. of oil per well per day many wells also produce fairly large volumes of water. Nevertheless, the maximum daily fluid production required from the majority of domestic wells is 100 to 300 bbl. Three hundred barrels per day is a rate of only 9 g.p.m. Yet, the smallest conventional well (5½-in.) has a capacity of more than 1,500 g.p.m., and lease separators are seldom rated below 18 g.p.m.

In these facts lies the challenge to develop ways to capitalize on the savings possible by sizing wells and production facilities realistically.

Most wells must occasionally be reworked or serviced. And, this fact must be considered in selecting well size. However, through-tubing completion and workover systems using wire-line tools or macaroni have proved themselves practical. In fact, these methods save 30% on land work and more than 85% offshore.

There have also been important developments for artificial lift in the small-diameter wells. Some of these developments are: wire-line retrievable gas-lift valves; macaroni-type gas-lift valves; the pump-out hydraulic pump; and, most recently, small, insert-type rod pumps for use in 1½-in. and 1¼-in. tubing on ½-in. or smaller rods.

Pistole is chief petroleum engineer, and True is division engineer, Humble Oil & Refining Co. This article is a condensation of a paper titled "Today's Economy—A Challenge to the Operators and Designers of Oil Field Equipment," presented at the thirteenth annual Petroleum - Mechanical Conference of the American Society of Mechanical Engineers, Denver, September 21-24, 1958.

What's needed for the '70's?

It isn't enough simply to expand today's experimental ideas into full field use. We must devote time to more radical concepts. For it is today's radical concepts that provide the early experimental application that becomes the basis for the developments of the 1970's. Here are some concepts we should work on:

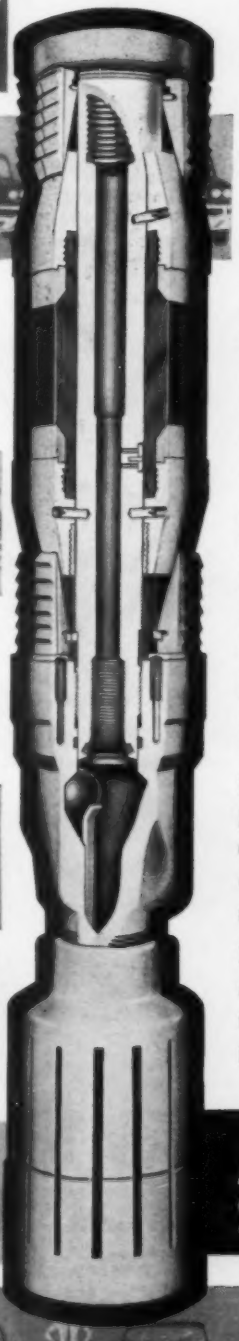
1. Means of converting a portion of the oil and gas entering the wellbore into energy that can be used for artificial lift.
2. Formation-evaluation equipment which can be incorporated in the well-drilling assembly for recording the formation lithology and the fluid content of formations penetrated.
3. Drilling devices which will generate a wellbore without the use of drill pipe for conducting power to the drill bit.
4. Equipment for subsurface separation of oil and water with means for water disposal in another formation in the same borehole, thus eliminating the cost of producing and subsequent disposal of the worthless fluid.

BY HARRY PISTOLE AND MARTIN E. TRUE
Humble Oil & Refining Co., Houston

What is needed? . . . Compare the steel tonnage required in conventional and small-diameter wells. As much as 70% can be saved in completely developing a one-well lease. To fully capitalize on the 2½-in.—or smaller—oil strings of tomorrow we need to develop these remaining tools and techniques:

- A small bit that will drill as fast as today's regular-size bit. One company has good results from a "bearingless" bit which can easily be scaled down to small-hole size. This experimental bearingless bit drilled 110% more hole at a 55% faster rate than a roller bit in a conventional size hole.
- A drilling rig designed for drilling small-diameter holes. Such a rig would be lightweight and highly portable and perhaps automatically operated. The hydraulic system, including the pumps, has to deliver low volumes at high pressures. High-strength, lightweight pipe would be needed. On a recent small-diameter well to 8,500 ft., total cost was cut to 50%.
- A system to evaluate formation characteristics and fluid content as the well is drilled. Part of the answer may lie in automatic mud and drilling-rate analysis coupled with downhole tools for taking formation-fluid samples instantaneously and for through-casing logging. A new wire-line drill-stem tester has obtained satisfactory samples of formation fluid. This tool is used with a special drill collar which carries the tester-packer during drilling operations. Total elapsed time for these drill-stem tests, which require no trips during opera-

DEPENDABLE
BAKER SERVICE



DEPENDABLE ***BAKER*** CEMENT RETAINER

PRODUCT NO. 400

There is nothing "just as good" as a Baker Cement Retainer for placing cement, plastic, acid or other fluids through tubing or drill pipe—at the most effective point behind casing or liner—around the shoe, or in open hole below the shoe. Dependable pack-off, known drillability, and the presence of a back-pressure valve which automatically holds squeeze pressure against the formation, bring peace of mind on all squeeze jobs.

SET POSITIVELY—DRILL UP EASILY

Baker Cement Retainers are set accurately and positively on tubing, drill pipe, or a wire line. Opposed slips prevent movement in either direction, and the resilient packing element is backed up by metallic rings to prevent packing element flow under the highest pressure differentials. Made of drillable CAST IRON or extremely drillable MAGNESIUM for any application or well condition.

Baker CEMENT RETAINER SERVICE is available anywhere, anytime. Just call the Baker Trained Serviceman in your area.

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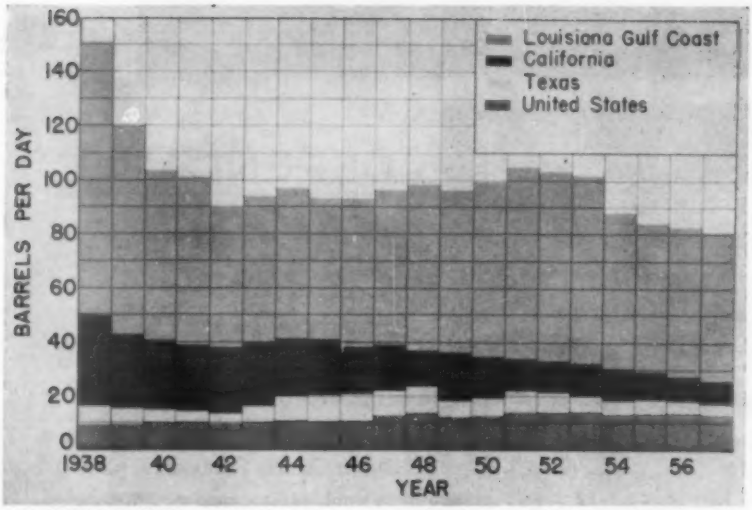
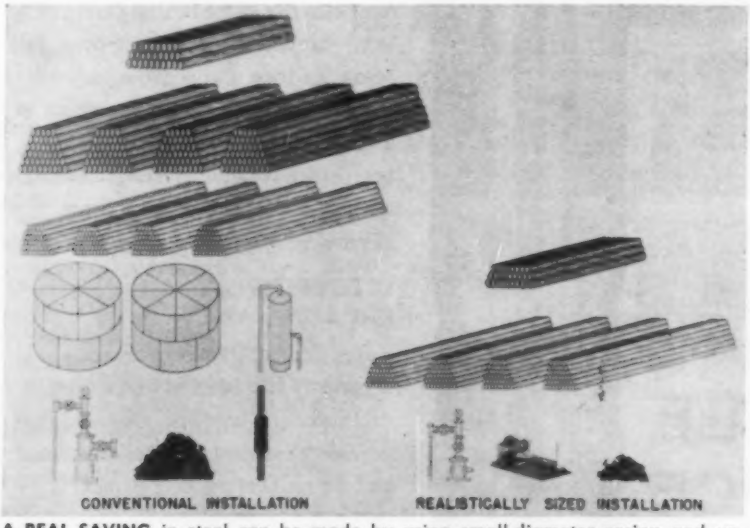
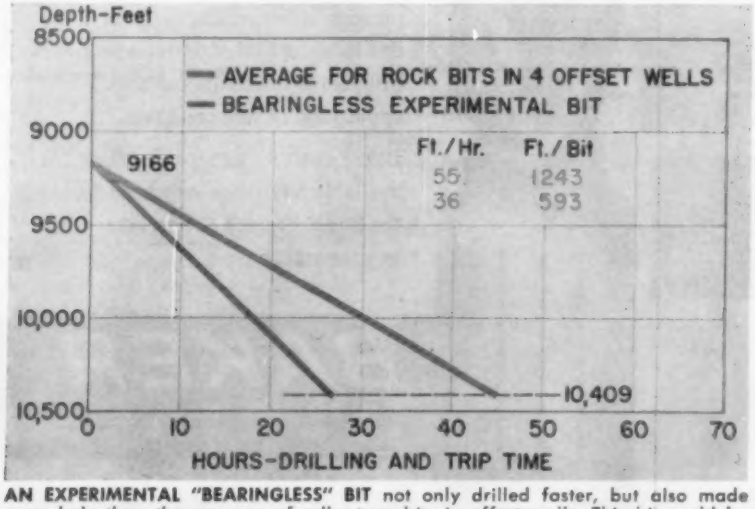


THE AVERAGE WELL in the U. S. produces only about 12 bbl. per day, but the well-casing and lease facilities are sized to handle many times this amount.



A REAL SAVING in steel can be made by using small-diameter casing and unitized and automatic lease facilities.



AN EXPERIMENTAL "BEARINGLESS" BIT not only drilled faster, but also made more hole than the average of roller-type bits in offset wells. This bit could be scaled down to ultraslim sizes.

tion, was less than 2 hours at 7,000 ft.

- A drilling fluid that drills as fast as water but still retains weight and sealing properties of mud. Lower solids content in the mud pays off. On some offshore wells, this has made it possible to save as much as $28 per foot.

Not a passing fancy . . . One company had, to the first of the year, completed 437 wells with hole sizes ranging from 4¾-in. to 6½-in. Total saving from this program was nearly $3,000,000.

To date, the same company has completed 28 wells with 2½-in. oil string. In many of these wells, no tubing string is needed or used. Savings on these wells have exceeded 30% in many cases.

Multiple Completions

Another avenue to reduce development costs has been use of multiple completions. Profitable duals led directly to the parallel tubing-string methods. Concurrent with this development has come the retrievable production tube. Wells with the retrievable tube are worked over by wire-line or macaroni-string tools. These techniques permit multicompletion wells to operate throughout their normal producing lives without the tubing being pulled.

Thus, the 2, 3, and 4-string multiple completions definitely point the way to cementing several small-casing strings in a single hole. Each string would be operated thereafter as a single well. Such a system makes an attractive saving in steel tonnage compared to today's multiple completion with its large-diameter oil string. Also, this method insures the reservoir separation and control so necessary to efficient oil recovery.

Actually, four such completions—two duals and two triples—have been successfully made. Savings in total cost was as much as 50%. For this completion procedure to be fully exploited, we need quick development of these two things:

1. A new system of corrosive inhibitors. Falling rate of the inhibitors in all types of formation fluids must be fast enough to insure complete protection of the casing without use of auxiliary pipes to carry the inhibitor to bottom.

2. A low-cost wellhead. This must permit rapid, trouble-free landing and positive sealing of the multiple casing strings, run either independently or together.

Lease and Well Facilities

Lease and well facilities are a big part of the industry's annual $1 bil-

These contractors use Bucyrus-Erie spudders for profitable secondary recovery, cleanout work . . . You Can, Too

These men profit from the speed and mobility of Bucyrus-Erie spudders. They get forward and reverse speeds on all reels and on the catheads for accurate, split-second control; free-wheeling reels for quick lowering; fast, powerful line pulls for easy handling of tools, packers, swabs, and tubing; and mobile design for time-saving moves.

Check the jobs pictured of today's popular choices for well servicing and secondary recovery — the 60-L, 28-L, and 36-L spudders, available for skid or trailer mounting. Then visit your nearby Bucyrus-Erie distributor or write us direct for all the facts.

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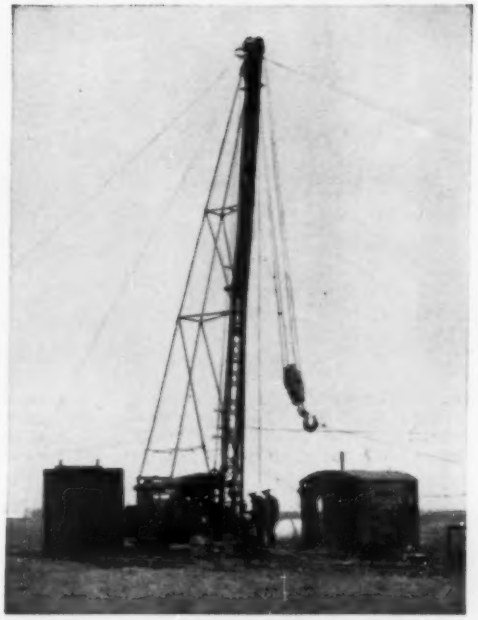
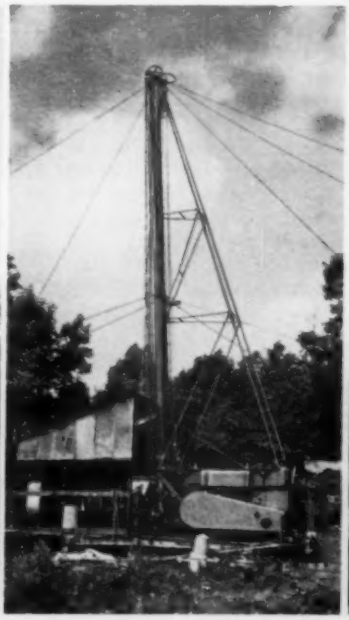


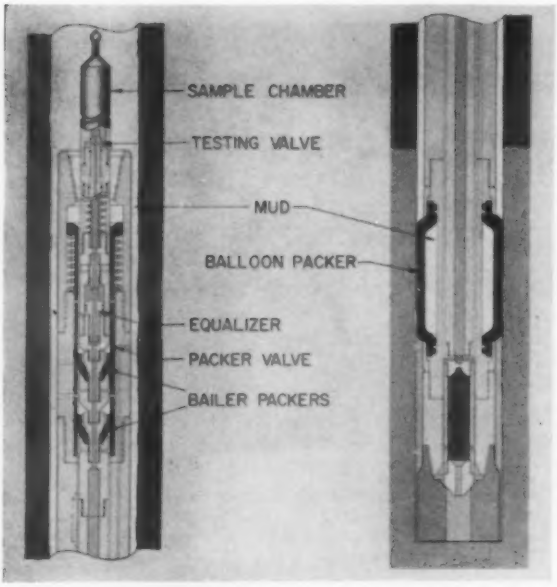
A 60-L owned by Gaines Drilling Co., El Dorado, Kans., cleans out a 1900-ft. well (about 40 years old) in a Cities Service water flood project west of El Dorado. Says Driller Mack Gaffney: "I like 'em. Bucyrus-Eries have a good snappy spudding motion." Driller Harley Nicholas adds: "I've worked a lot of rigs in different formations all over the country . . . and I like Bucyrus-Eries for their steady, trouble-free performance."

Owners of five Bucyrus-Erie spudders, Greer Bros., Whitesville, Ky. consider the 60-L as "the only rig for drilling in Kentucky". This 60-L is cleaning out a well in the Apex Field near Greenville. High line speeds assure rapid progress on hole after hole. Mobile trailer mounting, telescoping derrick, and folding tubular braces save time of moves.

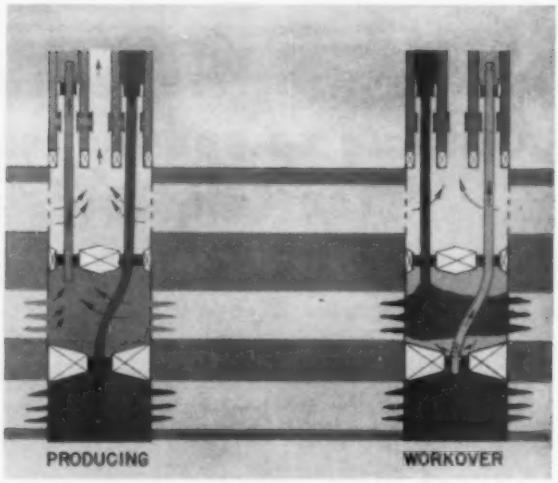


A Halliburton crew runs a Hydrofrac to increase the gas flow from a 3,113-ft. well in west central Pennsylvania. Joining in the operation, Ed E. Hess, Clarion, takes advantage of the speed, strength, and capacity of his 36-L to set casing, handle tubing, and run treatment packers.

"We had all kinds of equipment," says E. M. Hale, Ada, Okla., "but we've standardized on 28-Ls for quick moving. We worked over 23 wells in six months on a water flood project with never a breakdown for either rig." Hale (extreme right) watches his men swab fracture oil and fresh crude through perforations on a well in the Wetley Field.



A SPECIAL DRILL COLLAR carries the tester-packer during drilling operations. By using this with the wire-line drill-stem tester, a formation test at 7,000 ft. could be made in less than 2 hours with no round trip.



THE PRODUCTION TUBES can be taken out of the well so that one of the zones may be cemented or otherwise treated. Such tubes have already been used successfully.

lion purchases. In spite of this, most work of the past decade has been to develop (1) equipment for higher pressures; (2) semiautomatic tank battery and well operation; and (3) better liquid recovery from gas. But, automatic custody transfer equipment (LACT) may be the most important contribution to lease equipment in the past decade.

Best illustration of the saving from properly sized, prepackaged units, is the pumping unit. Gas-compressor facilities in small sizes offer the same opportunity for prepackaging. But, they are largely custom-assembled on location so that total cost is two or three times as much as the basic engine and compressor. Similarly, valves, meters, separators, treaters, tankage, and pipes are purchased as separate items.

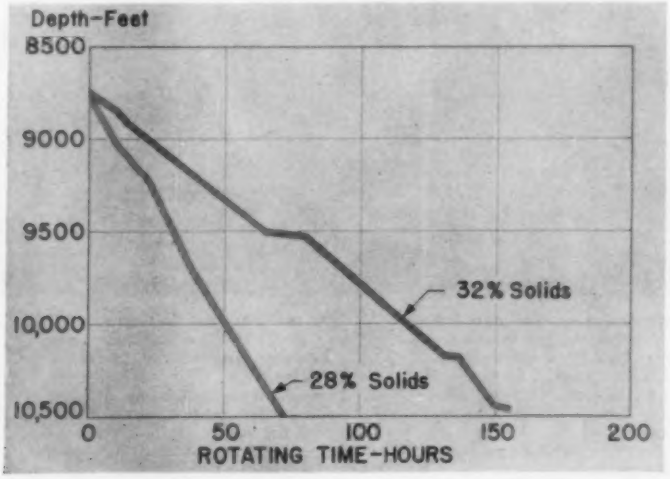
Battery on 4-ft. by 7-ft. skid . . . An initial effort to build an oil, water, and gas-separation unit with facilities for LACT—although mounted on a skid measuring 4 by 7 ft., performed all of the useful functions of a standard tank battery with a pipeline connection. This assembly, even custom-fabricated, still costs less than half as much installed as the conventional battery which it replaced, yet is even more portable than a pumping unit.

The system automatically separates oil, water, and gas; automatically compensates for temperature; and records the volume of pipeline oil delivered. It thereby eliminates the necessity of sampling and monitoring, essential in conventional LACT. The unit is also designed so that it can well become the heart of completely automatic, unattended lease operation. The temperature-compensating, volumetric-type oil-metering tanks in this facility have been extensively tested for over a year with conventional tank gaging as a check. The results can lead only to the conclusion that the meter tanks are more accurate than conventional procedures. Packaging units of this type in two or three sizes should provide adequate selection to meet the production load of any lease.

An auxiliary unit will be necessary in many cases. This is a similarly unitized, completely portable, gas-compression unit assembled in a few standard sizes as stock items.

The fifth component of major lease facilities in the future will provide storage where delivery of products as produced is impractical. The ultimate unit may be rubber or plastic collapsible tanks, particularly in areas where foundation costs for conventional tankage is high. These units could be interconnected by one man with properly sized small pipes on the lease as needed.

In summary, the major challenge is to develop realistic sized, major production units of high portability. It should be possible to interconnect these on the lease at negligible cost with minimum piping to provide automatic unattended lease operation.



LOWER SOLIDS CONTENT means faster drilling. Taking this a step farther, we could expect even faster drilling from chemical "muds" which are heavy but contain no solids.

International Petroleum Exposition

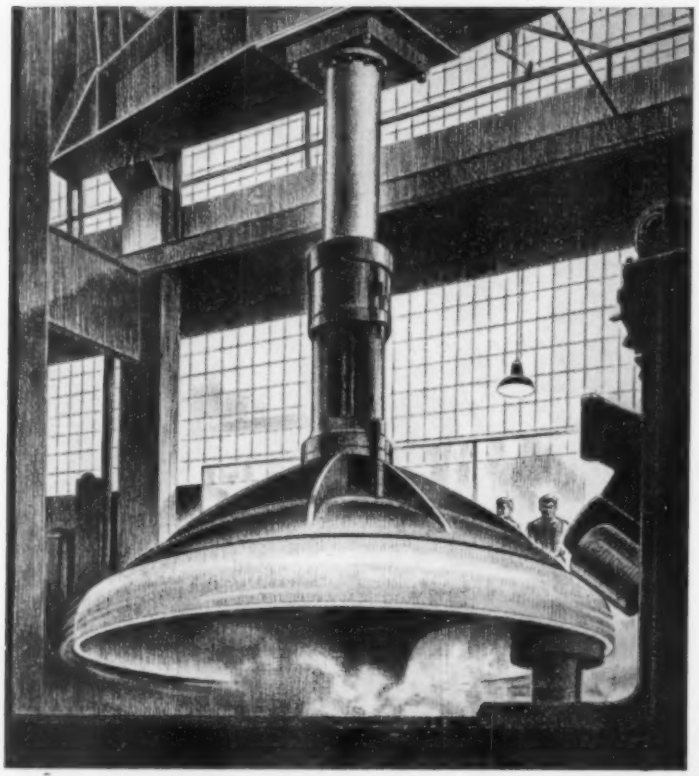
May 14-23 **1959** • Tulsa, Oklahoma, U. S. A.

Night view of IPE with Tulsa Skyline

For Accommodations, write:
IPE Housing Bureau
Oil Capital Building, Tulsa, Oklahoma
For Space, write:
International Petroleum Exposition
P. O. Box 5205 Donaldson Station
Tulsa, Oklahoma
W. K. Warren, President
Wm. B. Way, General Manager

Dates of the IPE set in conjunction with World Petroleum Congress to be held in New York a week after the Tulsa Show

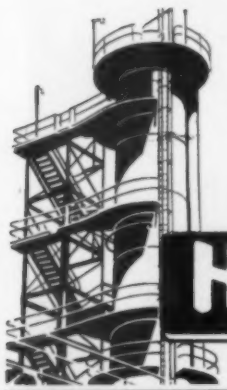
Spinning saves Metal —cuts tool costs



Dished and flanged ends Rotarpress spun by Harveys greatly facilitate the design and production of Pressure Vessels of all kinds. These ends combine semi-ellipsoidal form with large knuckle radius, allowing a substantial reduction in plate thickness to be effected, and in most cases the preparation and cost of expensive tools is eliminated.

'ROTARPREST' ENDS FOR PRESSURE VESSELS

can be supplied in Mild, Alloy and Clad Steels and non-ferrous metals. The capacity of the Rotarpress ranges from 5 ft. to 15 ft. diameter and from $\frac{3}{8}$ in. to 4 in. thickness; knuckle radii may be varied to meet individual requirements.



GET THE FACTS!

Our latest catalog gives details of the diameters and profiles to which 'Rotarprest' Ends can be produced, along with a table of tolerances and notes on the calculation of plate sizes for alternative flange depths. Send for Catalog No. OG 965.

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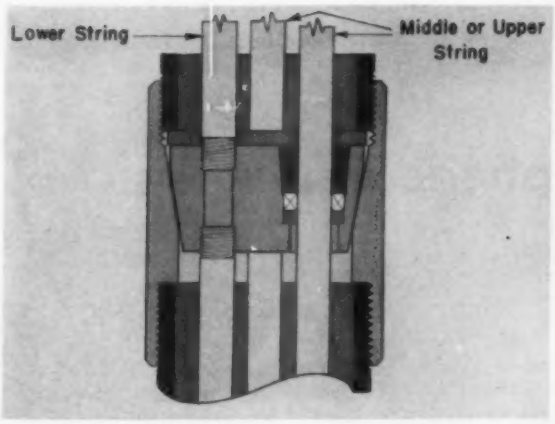
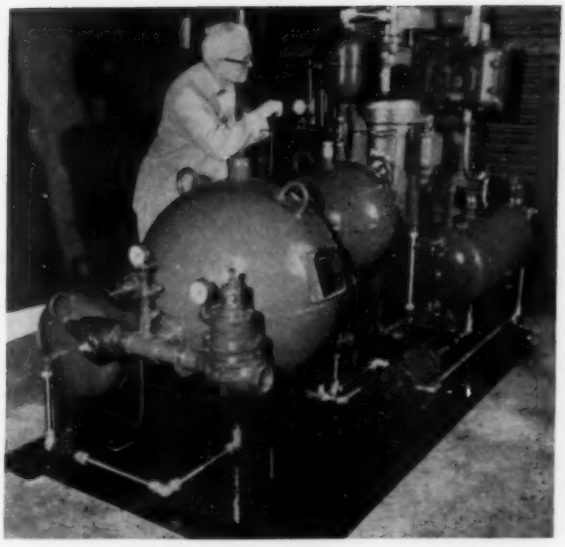
SPECIALISTS IN THE PRODUCTION OF DISHED AND FLANGED ENDS FOR THE PETROLEUM INDUSTRY.



SUGGESTED DESIGN for a low-cost, multiple-string wellhead. If this and other tools are developed, it will be possible to make cheap completions where two or more small strings are cemented side by side in open hole.



ON THIS 4 BY 7-FT. SKID are all the items needed to perform all of the useful functions of a 300-bbl. per day tank battery.

Some other components must be developed; the more important needed include:

1. A centrifuge for oil-water separation in the 2-3-hp. class. It should yield a finished product of 99.9% purity instead of the 99.999% pure product yielded by current commercial centrifuges.

2. A reasonably priced system to automatically compensate meter reading for water content. This is needed in merchandisable oil streams where a centrifuge is not required for water-oil separation.

Some other examples . . . We know it is feasible to inject gas as a means of recovering oil located structurally above the highest well. Gas injected for this purpose is lost unless another well is drilled for its recovery. The process suggests the need for a highly compact, fully unitized, low-cost inert-gas generator and compressor.

There are other examples where relatively small developments will have tremendous utility. One is a low-cost unit that would withdraw mechanical or electrical energy from a flowing liquid stream at remote locations such as an offshore platform. The energy loss in reducing pressure from 2,000 to 600 psi. could be used to generate power. This could operate safety and warning devices and supply energy for automatic operations.

To simplify accounting . . . The unitized production facility with automatic coding and well handling should largely eliminate routine manual and clerical operations associated with producing and accounting. Such automatic routing of production data on the lease will further open the door to complete machine accounting for production. If even 10 minutes of clerical time can be saved per run ticket eliminated, the saving becomes impressive. Consider how many run tickets are necessary to sell the annual U. S. oil production of 2.5 to 3.0 billion barrels. If each ticket totaled as much as 500 bbl., a million clerical manhours could be saved each year, not considering the saving in pumper and gager time.

In gas accounting, static and differential pressures are recorded in the field. Eventually, these are converted into standard cubic feet or B.t.u.'s. In this, much time and many conversions are needed to get something which perhaps could be measured directly—the weight of gas delivered. The mass-flow principle may simplify gas measurements and accounting as much as the positive-displacement meter simplifies oil measurement.

Toward cheap workovers . . . Many of the 2½-in. wells of tomorrow will be equipped with 1½-in. or 1¼-in. tubing. Practically all of the workover, artificial lift, and other equipment for 2-in. tubing of today, must be made available that much cheaper for the smaller sizes.

In fracturing, emphasis in the past has been on the high-rate, high-volume job. In the future, we will need to consider sand-falling rate, pumpability, fluid loss and such factors to fracture through small strings. In early experiments in this field, results have been satisfactory and power requirements were lower and cheaper.

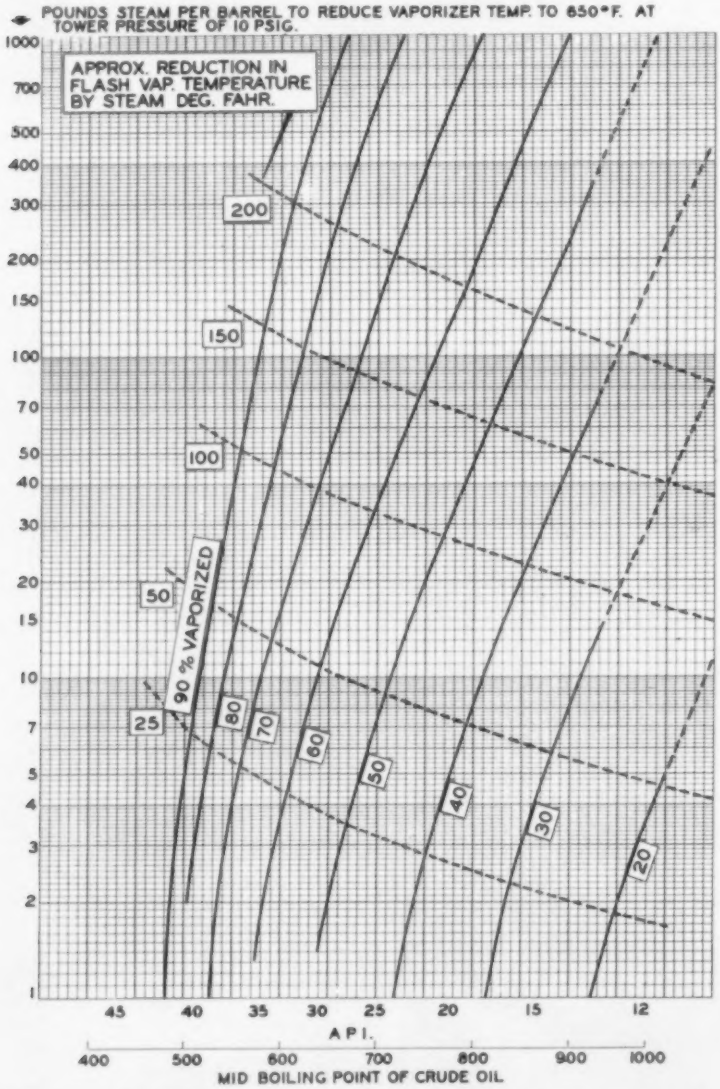
The small-diameter well of tomorrow will affect the size of workover and service units. They can be smaller, cheaper, and use less labor. As a result, it should be possible to gather as many as six separate service units into a single combination unit. This well service unit could perform complete reworking operations without other equipment being brought to the location.

SUCH LEASE STORAGE as this would make a saving especially where foundation costs are high. These could be connected by one man on the lease as needed.

Process steam for atmospheric distillation

BY W. L. NELSON
Technical Editor and
Petroleum Consultant

STEAM is widely used to cause vaporization by the reduction of the partial pressure of the oil vapors in the vapor phase. The amount required rises rapidly with increased vaporization as indicated in Fig. 1 which applies primarily to crude oils. Although Fig. 1 is based on crude oils of normal boiling range, the same general behavior is evident with all types of stocks. For narrow-boiling-range materials (slopes less than 7° per per cent) the lines of "percentage vaporized" of Fig. 1 are spread apart (on both sides of the 50% vaporized line), and for those rare materials that have steeper slopes than 11 (degrees per per cent) the vaporization lines gather together toward the 50% vaporization line.



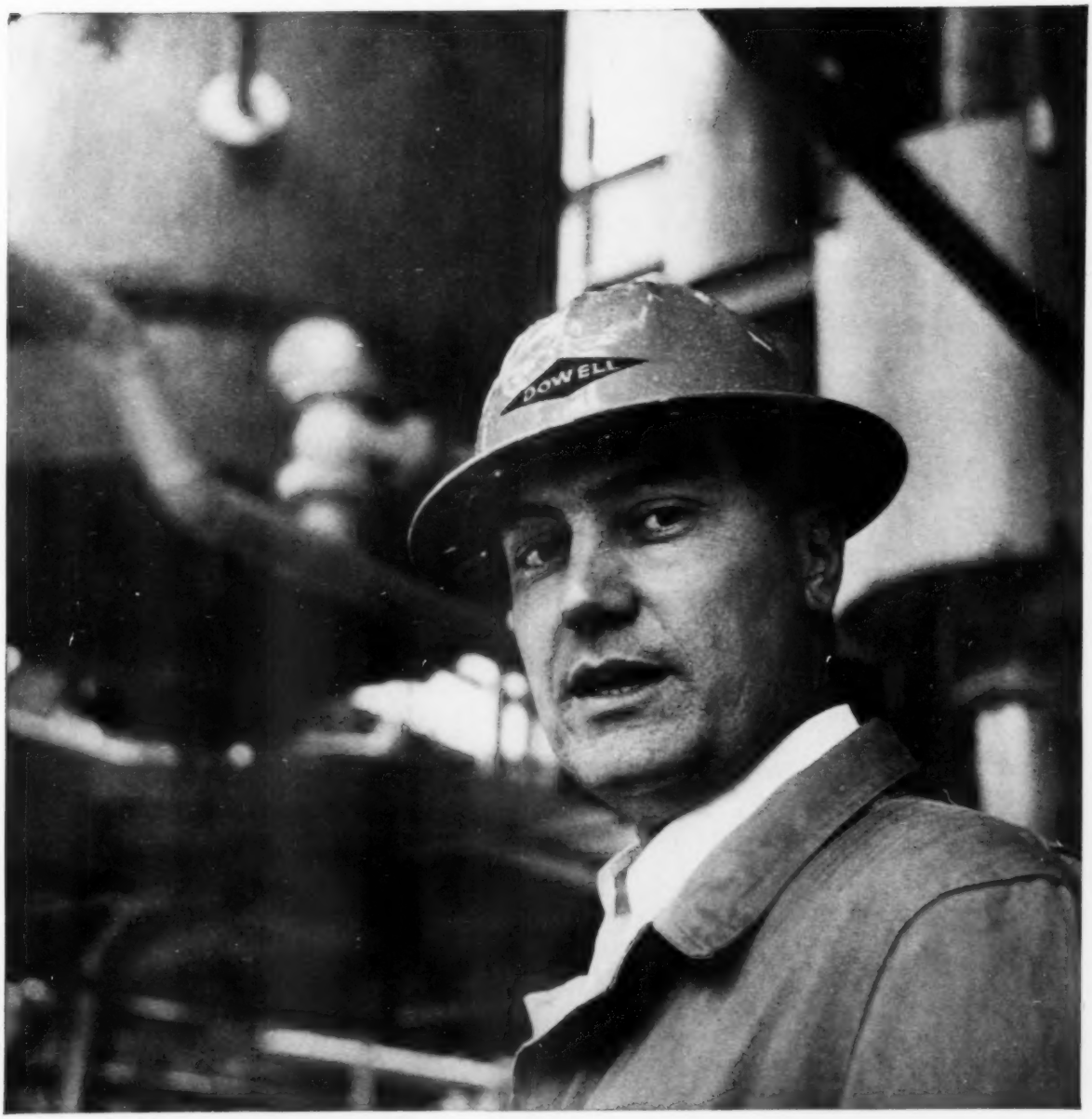
APPROXIMATE AMOUNT of process steam required in distilling crude oils. Fig. 1.

Fig. 1 was computed for a vaporizer temperature of 650° F. at a pressure of 10 psig. It can be used, however, with fair accuracy for other vaporizer temperatures or at other near-atmospheric pressures by means of the dotted lines which indicate the reduction in temperature accomplished by the steam. Thus for 600° F.-midboiling-point crude oils (about 33° API), about 4 lb. of steam per barrel is required when vaporizing 60% of the crude oil to reduce the vaporizer temperature by 25° F. If the flash temperature (at 60% vaporized) without steam is 630° F., it will be about 605° F. with 4 lb. of steam.

Obviously, the use of more than about 50 lb. of steam per barrel is not economically feasible because not only is the steam expensive (2.3 cents per bbl. of crude oil) but water for condensing and cooling also constitutes a significant cost (0.3-0.6 cents per bbl.) not to mention the extra cost of larger towers, lines, condensers, and reflux pumps. All other topping-plant direct-operating costs amount to only 5 to 8 cents per barrel (see Process Costimating No. 27, Cost of Operating Topping Plants, Sept. 22, p. 113).

The crude oils used in computing Fig. 1 have the following distillation properties:

Approx. API gravity	Mid B.P. °F.	Slope, deg. per cent Dist.	Flash
40	510	8.6	5.9
30	640	10.0	7.0
20	775	10.8	7.7
15	865	11.7	8.4
12	980	13.0	9.3



HOW YOUR PLANT CAN PROFIT FROM THIS MAN'S SKILL. Dowell engineers are experts in the use of chemical solvents to remove scale and sludge—those profit-robbing deposits that cut the capacity of your process systems, tanks, piping. Using the Dowell method of chemical cleaning you get more throughput, less down time—to make possible greater overall plant efficiency.

Here's how one corporation employed the skill of the Dowell engineer and his group: Following construction and before the plant was put on stream, the company called in Dowell to remove mill scale.

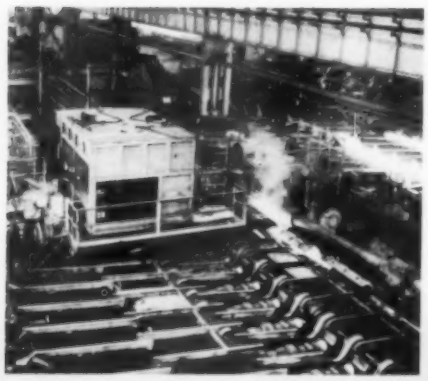
Total cost of this mill scaling service was $5000. Once in production the plant did not have a single major shut-down for maintenance due to mill scale. Management of the plant credits Dowell service with helping them net an operating profit of somewhere between 10 and 20 times the cost of the chemical cleaning. That amounted to between $50,000 and $100,000 the first year.

With Dowell service you get 15 years experience in chemical cleaning, full lines of equipment and chemicals—plus an engineered job—performed by trained crews.

Every type of industry can profit from Dowell methods of chemical cleaning. Ask your maintenance and operating engineers if they have all the facts—the profit possibilities—on Dowell service. DOWELL—A SERVICE DIVISION OF THE DOW CHEMICAL COMPANY. Headquarters and research center, Tulsa, Oklahoma; 165 offices and stations to serve you.

Chemical cleaning services for industry DOWELL

WHEREVER YOU FIND PIPE WITH ORANGE BANDS YOU'LL FIND A SMART PIPE BUYER



Youngstown's ultra-modern, fully-automated No. 3 Seamless Mill —now operating at our Indiana Harbor Works near Chicago— turns out the pipe with the orange bands, the finest made anywhere. Illustrated is the piercing operation at which point a hole is made down the middle of a solid round steel billet. Here is where Youngstown's quality and dependability is built into the pipe with the orange bands.

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Youngstown 1, Ohio*

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Houdry has had 30 years of continuous activity in the development and design of catalytic processes and catalysts. It has accumulated experience, know-how and facilities unmatched in its field.

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- Provides technical service to assist in selection of catalysts and operation of processes
- Offers contract research to assist in the development of individual processes and products . . . through catalysis

Today, Houdry is accelerating the development of new and improved catalytic processes and catalysts for even more efficient—and profitable—processing than ever before.

In solving the many catalytic problems brought to us, we may already, in essence, have solved yours. Consult with us.

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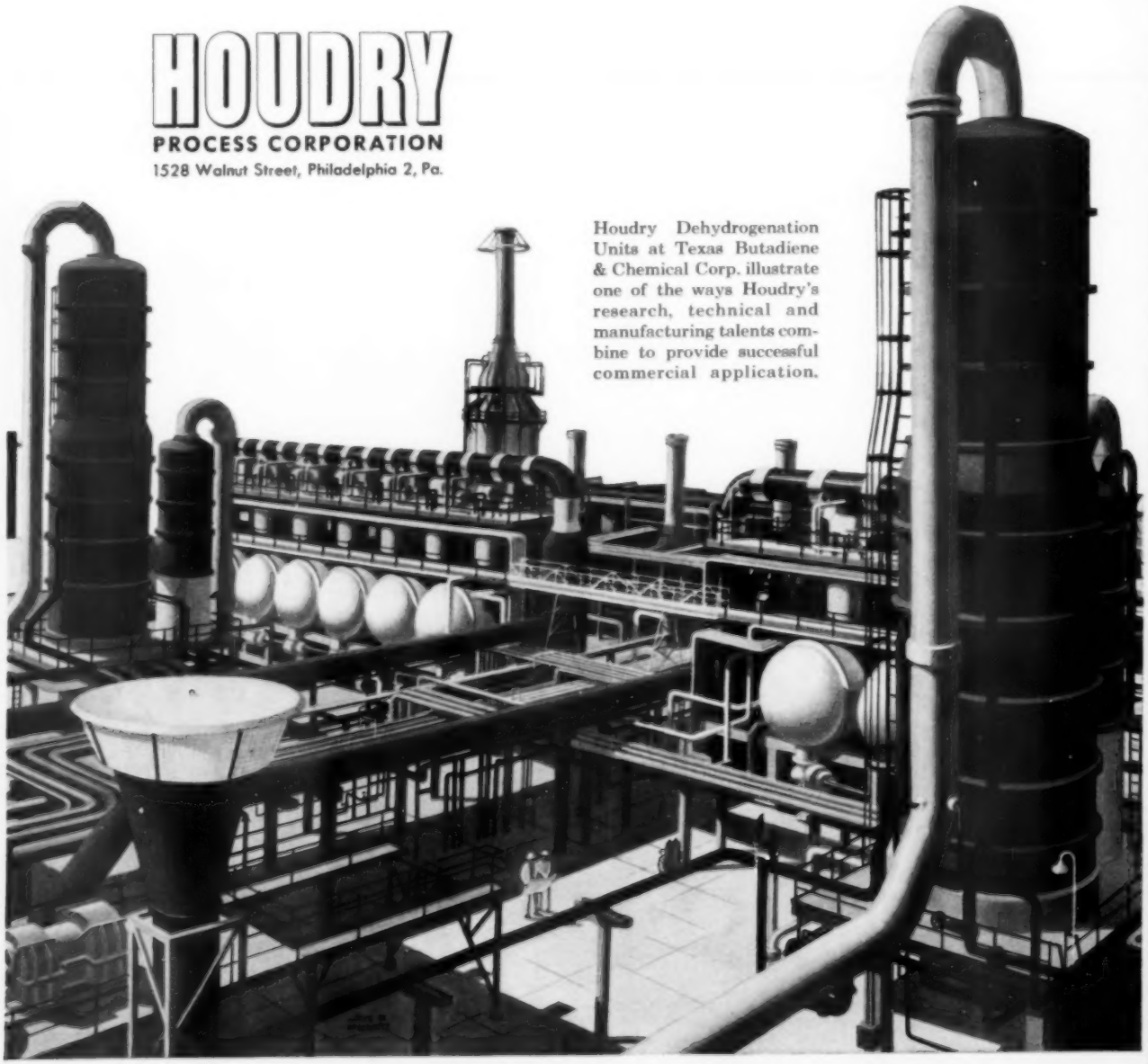
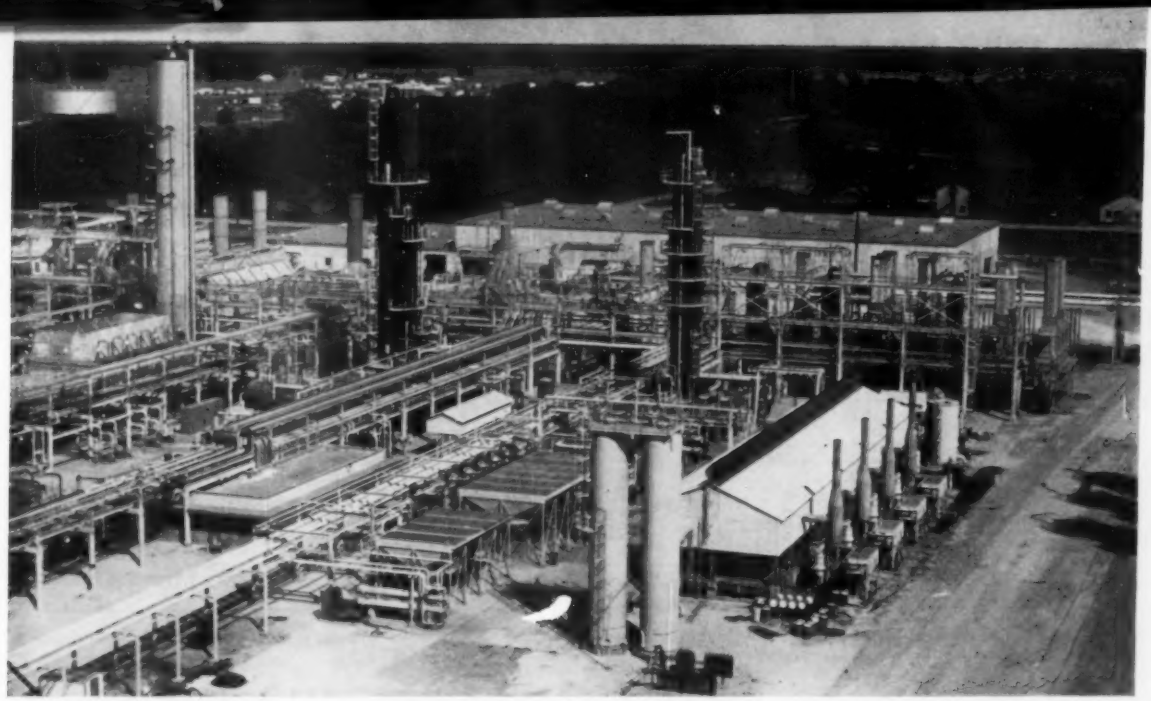


Houdry Dehydrogenation Units at Texas Butadiene & Chemical Corp. illustrate one of the ways Houdry's research, technical and manufacturing talents combine to provide successful commercial application.



THIS CATALYTIC REFORMING UNIT uses a high-end-point charge stock. Catalyst cases and heaters are at right background. Center towers are, left to right, prefractionators and reformate stabilizer. Tower at far left is prefractionator for low-end-point unit.

REFINING

SEGREGATED FEED STOCKS charge two catalytic reforming units

Phillips uses one reformer for low-end-point charge and one for high-end-point charge thereby taking advantage of inherent characteristics of feed.

BY LARRY RESEN
Refining Editor

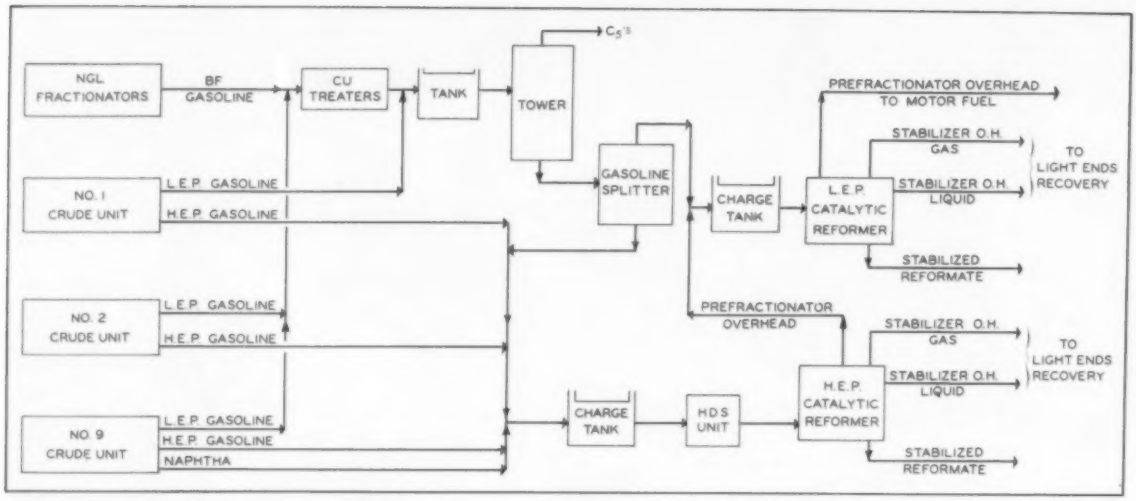
HAVING the l.e.p. unit available makes it possible to take advantage of light ends at Sweeny where Phillips Petroleum Co. has a large natural-gas-liquids fractionating unit.

At the present time, two catalytic reforming units using UOP platinum catalyst, are installed at the plant. The first unit, now the h.e.p. unit, was originally designed for 16,000 bbl. per day and its capacity has since been upped to 18,000 bbl. per day. The new unit, now the l.e.p. unit, is designed for a charge of 16,000 bbl. daily.

A basic difference in the two units is the lower operating pressure of the l.e.p. unit which operates with a pressure of 300 psig. on the product separator, with the reactors being somewhat higher. The h.e.p. unit meanwhile operates at a 450-psig. separator pressure.

This pressure arrangement takes advantage of the charge properties since it is possible to reform lower-boiling-point material at lower pressures without coke laydown becoming a problem. The heavier charge requires a higher pressure to minimize coke laydown. The octane-yield relationship for the lighter material is more favorable at the low pressure.

Unit flow . . . The interunit process flow scheme gives an excellent overall picture of the feed-stock-segregation procedure. The emphasis here is on the feed-preparation facilities which make the necessary cuts between low and high-end-point charge material. Low-end-point gasolines from two crude units (Nos. 2 and 9) combine with butane-free gasoline from the natural-gas-liquids fractionators for a pass through copper treaters. This is necessary since the natural gasoline is largely derived from West Texas output and the crude units handle sour stock. A third crude unit (No. 1) handling



GASOLINE STREAMS from natural-gas-liquid fractionators and three crude units are split into low and high-end-point material for charging to the two catalytic reformers.

sweet crude produces gasoline which bypasses the copper treaters.

The entire light stream enters a charge tank from where feed is charged to the depentanizer tower. All C_5's are pulled off in this tower for further handling and the bottoms are then charged to a gasoline splitter. The primary purpose of this splitter is to make the light-end-point cut and the overhead of this vessel is held to about 300° F. end point. The tower bottoms are charged through a hydrodesulfurization unit to the h.e.p. unit. The gasoline-splitter-overhead stream is joined by the prefractionator overhead from the h.e.p. unit and this stream serves as the charge to the l.e.p. unit.

The h.e.p. unit receives its charge from the three crude units in addition to the splitter bottoms. A hydrodesulfurization unit treats the combined stream before it is charged to the reforming unit.

Process flow . . . Since the basic process remains unchanged, only one flowsheet of the reforming process is shown. However, it has been flagged to point up the differences between the two units, with the basic flowsheet shown being the l.e.p. installation.

The initial comparison occurs in the prefractionator towers. The l.e.p. unit includes a 47-tray tower compared with a 35-tray tower in the h.e.p. unit. The purpose here is to avoid reforming C_6's and a finer cut is naturally possible with the greater number of trays. The overhead from the prefractionation light-end unit consists primarily of these components which are blended to motor fuel. The C_7's-plus bottoms are the charge to the reformer.

On the h.e.p. unit the reactor charge is taken off a side draw tray. This has an end point of about 400° with the 10% ASTM distillation boiling point running between 240°-250°. The light overhead from this prefractionator goes in with charge to the l.e.p. fractionator as previously noted.

The next contrast between the units ties in directly with the lower operating pressure of the l.e.p. units. In this case the flow lines and the reactors are both larger to permit adequate flow at the reduced pressures. It should be noted that the design of the unit provides for operating at the higher pressure if desired and all design specifications were written to take this into consideration. Continuing again with the pressure considerations, the reactor charge-to-effluent exchangers on the low-pressure unit are installed in parallel while those on the high-pressure unit are arranged in series. The parallel setup permits operation with a lower pressure drop and hence was more attractive in design of the low-pressure unit.

The compressor installation is of interest. On the l.e.p. unit a centrifugal compressor is handling the entire recycle gas load. This has been quite satisfactory and its simplicity is preferred over the four reciprocating units installed on the other reformer.

With the handling of light ends it was deemed advisable to include a deethanizing section in the l.e.p. unit area to recover propane and heavier products from the overhead liquid and gas streams from the stabilizers of the two reformers. Charge to the deethanizing section also includes, however, a butane stream from the crude units.

Operations . . . Table 1 shows operating conditions while Table 2 shows

TABLE 1—OPERATING CONDITIONS

	H.e.p.	L.e.p. (design)
Prefrac. charge, bbl./hr.	967	1,167
Prefrac. O.H., bbl./hr.	186	500
Reactor charge, bbl./hr.	675	667
Prefrac. btms, bbl./hr.	106	...
Stab. ref., bbl./hr.	615	540
Ref. L.V. % (before frac.)	85.7	80
Stab. O.H. liq. yield, bbl./hr.	21	87
Stab. gas yield, M.c.f.d.	1,628	1,350
Sep. gas yield, M.c.f.d.	8,057	17,800
Hydrogen-hydrocarbon mole ratio	7.8	6.0
Reactor temp., °F. (1-2-3 react.)	925-900-890	975-975-975 (max.)
Prod. sep., psig.	450	300 to 450

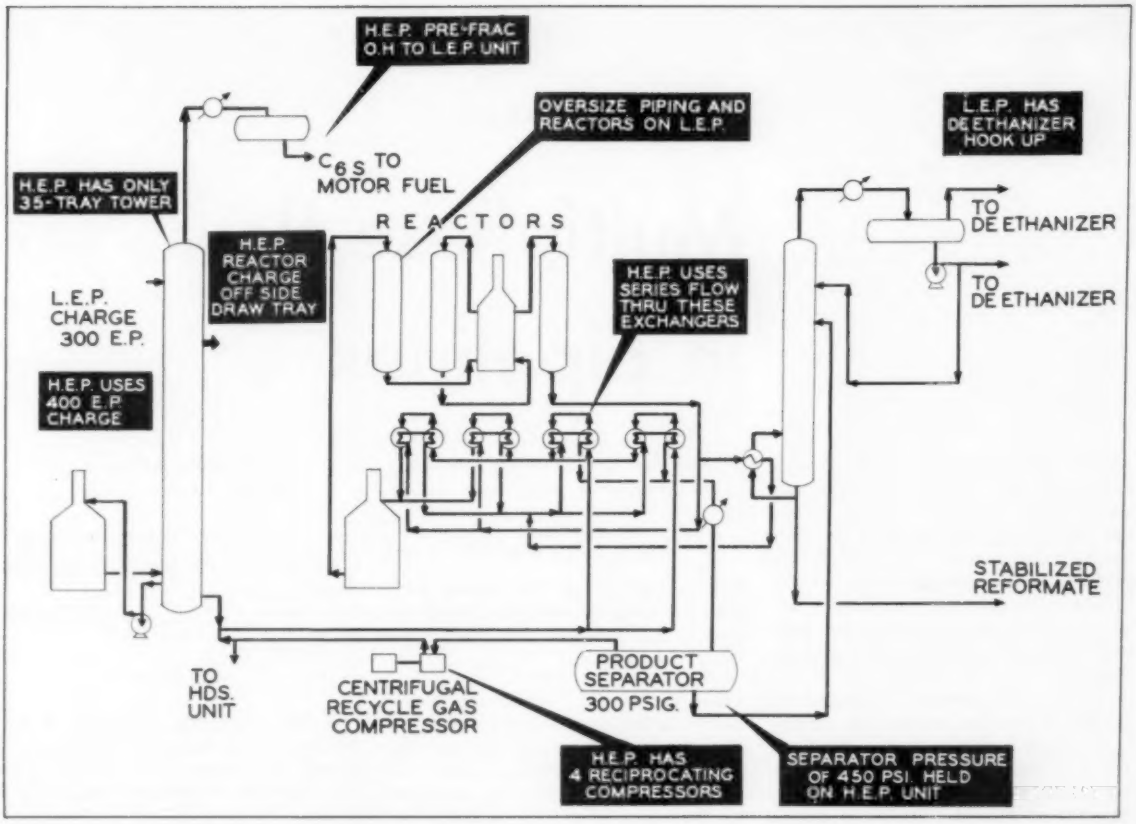
TABLE 2—ANALYSES

Reactor

	H.e.p.	L.e.p. (operating)
°API gravity	52.9	64.0
ASTM distillation:		
I.b.p.	203	167
10%	248	177
50%	286	188
90%	325	222
End point	387	300
Reformate:		
°API gravity	52.7	60.3
R.v.p.	7.9	4.5

Reformate

ASTM distillation:		
I.b.p.	100	146
10%	143	163
50%	262	185
90%	327	231
End point	398	332
Research Oct. No.:		
+3 cc. TEL	97.1	92.5
Charge analysis:		
Naphthenes	52	41
Aromatics and olefins	13	6
Paraffins	35	53
Reformate analysis:		
Naphthenes	13	16
Aromatics and olefins	44.1	29
Paraffins	42.9	55


H.E.P. PRE-FRAC O.H TO L.E.P. UNIT
OVERSIZE PIPING AND REACTORS ON L.E.P.
L.E.P. HAS DE ETHANIZER HOOK UP
C6 S TO MOTOR FUEL
H.E.P. HAS ONLY 35-TRAY TOWER
REACTORS
TO DE ETHANIZER
TO DE ETHANIZER
H.E.P. REACTOR CHARGE OFF SIDE DRAW TRAY
H.E.P. USES SERIES FLOW THRU THESE EXCHANGERS
L.E.P. CHARGE 300 E.P.
H.E.P. USES 400 E.P. CHARGE
STABILIZED REFORMATE
TO HDS. UNIT
CENTRIFUGAL RECYCLE GAS COMPRESSOR
PRODUCT SEPARATOR 300 PSIG.
H.E.P. HAS 4 RECIPROCATING COMPRESSORS
SEPARATOR PRESSURE OF 450 PSI. HELD ON H.E.P. UNIT

DIFFERENCES BETWEEN TWO REFORMERS are flagged on this basic flowsheet. Shown is the l.e.p. installation with appropriate comments about the h.e.p. unit.

Conversion of naphthenes is more complete with high-boiling charge

the analyses of the charge and reformate streams. In the case of the h.e.p. unit typical operating conditions are shown, while design conditions are listed for the l.e.p. unit. However, the analyses for the latter unit are also based on samples from the operating unit.

Comparisons between data are interesting. The h.e.p. data reflect the side draw used for its reactor charge with 675 bbl. per hour taken off here in addition to bottoms of 106 bbl. per hour. The l.e.p. unit has no side draw and no separate bottoms stream with the entire prefractionator bottoms serving as reactor charge. As was noted stabilizer overhead liquid yield is zero on the h.e.p. unit but is 87 bbl. per hour on the other unit. Reactor temperatures normally run somewhat lower on the l.e.p. unit and the pressure difference has already been discussed. Reformate octane numbers are varied as required to meet refinery gasoline-blending requirements.

A good comparison between the charge stocks may be seen in the analyses in Table 2. The API gravities reflect the differences with the 52.9° of the h.e.p. unit being considerably lower than the 64.0° gravity in the other charge stock. The ASTM distillations also show this quite graphically. The 387° and 300° F. end points are evidence of the difference in the feeds, but the 10% point of the h.e.p. compared with the 90% point of the l.e.p. unit is even more graphic. The 248° F. of the h.e.p. 10% point is much higher than the 222° of the 90% point or the l.e.p. charge.

These contrasts are not quite so graphic in the reformate analysis but still significant. The differential between the gravities narrows somewhat, but the 52.7° of the h.e.p. is still quite a bit under the 60.3° of the l.e.p. The distillation curves, meanwhile, are also closer together with the end points being 398° and 332°, respectively. And the i.b.p. and 10% point of the h.e.p. reformate are actually lower than the l.e.p. product's comparative points.

Composition of the charges shows the high naphthenic content of the h.e.p. stock and the high paraffin content of the l.e.p. stock, with this latter being much lower in aromatics, 6% vs. the 13% of the h.e.p. charge. The conversion of naphthenes is more complete with the high boiling charge. The lower aromatics content of the l.e.p. reformate is seen with its having 29% compared to the 44.1% of the h.e.p. unit.

Acknowledgments . . . Cooperation of the management of Phillips Petroleum Co. in the release of this information and assistance in its compilation is gratefully acknowledged.

PROGRESS REPORT:

Multiphase flow in pipelines

BY OVID BAKER
Magnolia Petroleum Co.

MOST ENGINEERS dealing with two-phase flow for the first time are surprised to find that pressure drops are often 10 times as great as they would have expected from their experience with single-phase flow. Even condensation of small amounts of liquid hydrocarbons in natural-gas lines will reduce efficiency to 80% or more (Fig. 1).

These high pressure drops can be traced to the fact that when a mixture of gas and oil enters a pipeline, the two phases tend to separate. The gas flows rapidly down the pipe leaving the oil behind. The oil is moved slowly by the drag of the gas on interface between the two phases. Since the gas is moving 2 to 10 times as fast as the liquid, the liquid phase begins to accumulate in the pipeline.

When equilibrium is established and the oil is leaving the line as fast as it enters, it is found that a large portion of the pipe is filled with liquid. As shown in Fig. 2, the liquid may occupy as much as 80% of the volume of the pipe. The liquid holdup in the pipeline is a function of the term X.[2,3]

$$X = (\Delta P_L / \Delta P_G)^{1/2} \qquad (1)$$

The pressure drops for liquid, ΔP_L, and gas, ΔP_G, are each calculated assuming that it is the only fluid flowing in the pipeline.

Other factors . . . There are several factors affecting the liquid holdup in the pipeline that are not indicated by this relationship. Some of these factors are: (1) gas phase in turbulent or streamline flow, (2) liquid phase in turbulent or streamline flow, (3) angle of the pipe with the horizontal, (4) the absolute pressure of the gas and oil, (5) roughness of the pipe, (6) heating or cooling the pipeline, (7) pipe diameter, and (8) flow pattern.

It is very difficult to estimate numerically the effect of these various minor variables on the liquid holdup.

The holdup of liquid in the pipeline reduces the area for flow of the gas. The gas-flow equation shows the pressure drop to be inversely proportional to the fifth power of the pipe diameter open for flow.

$$\Delta P_G = \frac{Q^2 L' f S T Z}{20{,}000\ D^5\ P_{avg.}} \qquad (2)$$

Table 1 indicates the effect of liquid holdup on the equivalent diameter remaining for gas flow and the relative increase in pressure drop implied by Equation 2.

Although liquid holdup could increase pressure drop 40-fold at $X = 10$, it does not account for all the loss caused by two-phase flow.

Velocity effect . . . When the interface between the gas and oil is smooth, the energy lost by the gas to this liquid surface is about the same that it would lose to a smooth pipe wall. This energy is transferred to the liquid at almost 100% efficiency and is the source of the energy used in moving the liquid along the pipe.[4]

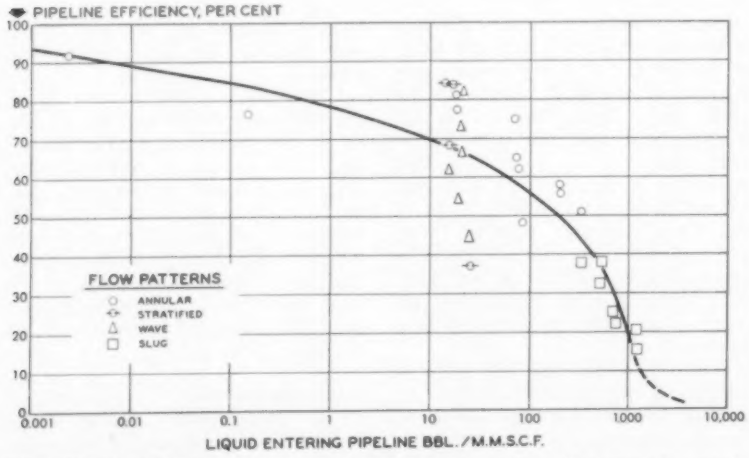
When gas velocity increases, waves begin to form on the surface of the liquid. The heights of the waves increase with increased velocity until they almost equal the diameter of the pipe. At atmospheric pressure doubling the difference in velocity between the gas and liquid may reduce the efficiency of energy transfer to 50%. The lost energy is dissipated in lifting the waves of liquid. These liquid waves create a situation analogous to roughness in a pipeline.

The friction factor for complete turbulence[5] in gas flow can be estimated by the equation:

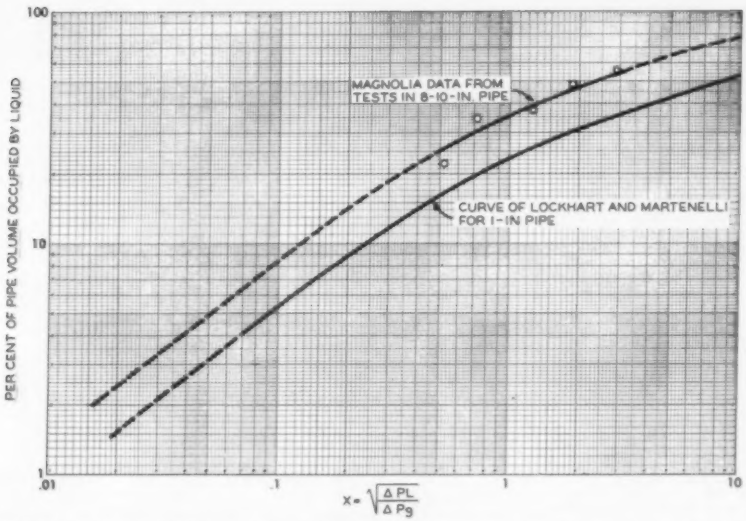
$$\frac{1}{(f)^{1/2}} = 4 \log \left(\frac{3.7\ D}{K} \right) \qquad (3)$$

where D is pipe diameter in inches

Paper presented at AGA meeting, New York City, 1958.



EVEN SMALL AMOUNTS of liquid hydrocarbons will reduce efficiency of natural-gas lines. Fig. 1.



LARGE PORTION OF PIPELINE may be filled with liquid when equilibrium is established and liquid is leaving as fast as it enters. Fig. 2.

TABLE 1—APPROXIMATE EFFECT OF LIQUID HOLDUP IN PIPELINE ON GAS PRESSURE DROP ESTIMATED FROM GAS-FLOW EQUATION

X	Holdup per cent of pipe filled with oil	Relative diam. for gas flow	H = relative gas pressure drop due to liquid holdup	Relative two-phase pressure drop from all causes, ϕ^2_{GTT}
0	0	1	1	1
0.04	4.1	0.979	1.11	2.37
0.1	8.4	0.956	1.25	3.42
0.4	22	0.884	1.85	8.0
1	36	0.800	3.06	17.64
4	60	0.633	9.80	90.2
10	78	0.469	44.1	306

TABLE 2—HYPOTHETICAL EFFECT OF ROUGH WAVES ON RELATIVE PRESSURE DROP

Height of waves as a fraction of pipe diam.	f_G	R = relative gas pressure drop due to wave roughness	$\frac{1}{(f_G)^{1/2}}$	R_e for gas phase where complete turbulence begins
0	0.004	1	15.8	160,000
0.001 D	0.0049	1.225	14.3	60,000
0.01 D	0.00948	2.37	10.3	4,600
0.1 D	0.0253	6.32	6.27	Less than 2,000
0.25 D	0.0457	11.425	4.68	Less than 2,000
0.5 D	0.0823	20.6	3.48	Less than 2,000
D	0.285	71.2	1.872	Less than 2,000

TABLE 3—CALCULATED EQUIVALENT WAVE HEIGHTS FOR TWO-PHASE FLOW

X	H Relative ΔP due to liquid holdup	ϕ^2_{GTT}*	$R = \phi^2/H$ Relative ΔP due to wave roughness	Equivalent wave height as fraction of pipe diam. Eq. 3
0	1	1	1	0
0.04	1.11	2.37	2.13	0.0068
0.1	1.25	3.42	2.74	0.0145
0.4	1.85	8.0	4.32	0.046
1	3.06	17.64	5.76	0.08
4	9.8	90.2	9.20	0.18
10	44.1	306	6.94	0.12

*Reference 2.

and K is the equivalent height in inches of rough uniform sand grains coating the wall of the pipe.[6] The relative increase in pressure drop caused by rough waves on the surface of the liquid can be estimated from Equation 3 by substituting various wave heights for K. The results of these calculations are shown in Table 2.

The two corrections to the gas pressure drop may be made as follows:

$$\Delta P_{TP} = \Delta P_G \, H \, R \qquad (4)$$

where H and R are the relative increases in gas pressure drop due to liquid holdup and wave roughness. Martinelli[2] proposed a correction to gas pressure drop which in effect combines the holdup and roughness effects.

$$\Delta P_{TP} = \Delta P_G \, \phi^2_{GTT} \qquad (5)$$

$$H \, R = \phi^2_{GTT} \qquad (6)$$

Visual studies of movies of two-phase flow indicate that wave heights often are 0.1 of the diameter and sometimes 0.75 of the diameter. Table 3 shows some calculated equivalent wave heights from Equation 6 using Martinelli's value for ϕ_{GTT}.

Since the magnitudes of the calculated and observed wave heights are the same, it appears that the large two-phase pressure drops can be accounted for by factors familiar to us from our experience with gas flow.

Flow patterns . . . Fig. 3 is a generalized plot of the flow-pattern regions which we have prepared from the data of Jenkins,[8] Gazley,[4] Alves,[7] and Kosterin.[9] The boundaries of the various flow pattern regions are shown as functions of G, the mass velocity of the gas phase, and L/G, the ratio of mass velocities of the liquid and gas phase.

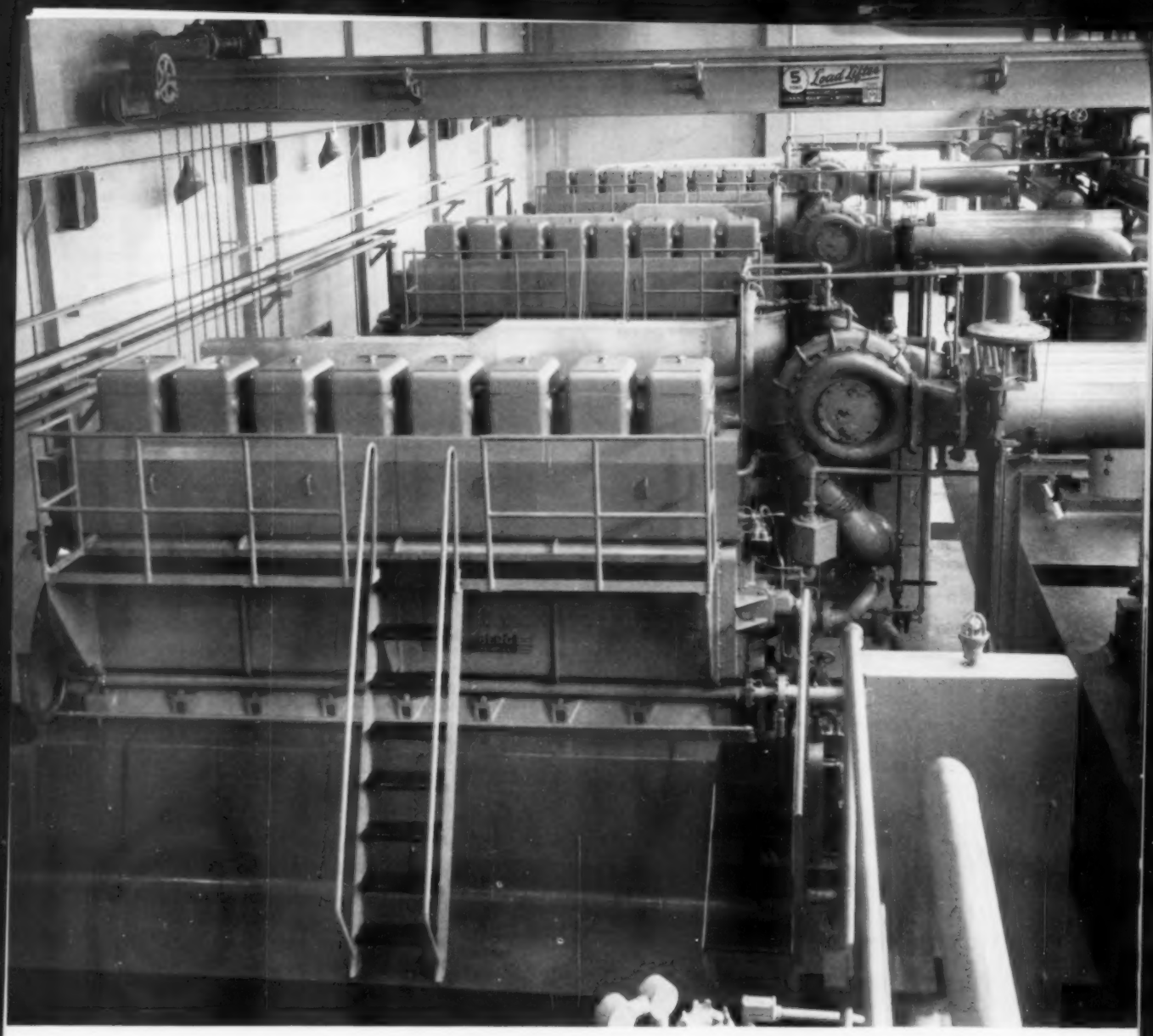
Since most of the available data are for the air-water system at atmospheric pressure, correction factors have been introduced to adjust for other liquids and gases. Holmes suggested[10] these terms for correlating the flooding point in wetted-wall distillation columns. The gas mass velocity is divided by:

$$\lambda = [(\rho_G/0.075)\,(\rho_L/62.3)]^{1/2}$$

and the L/G is multiplied by $\lambda\psi$ where:

$$\psi = (73/\gamma)\,[\mu_L\,(62.3/\rho_L)^2]^{1/3}$$

ρ_G and ρ_L are the gas and liquid densities at flowing conditions in pounds per cubic foot. The surface tension of the liquid γ, is in dynes per centi-



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meter and the liquid viscosity, μ_L, is in centipoise.

Although the borders of the various flow-pattern regions in Fig. 3 are shown as lines, in reality these borders are rather broad transition zones. Each observer probably selected the transition at slightly different points. Not all observers have used the same nomenclature and it was necessary to equate terms in some cases. Fig. 3 is based on data from 1, 2, and 4-in. pipe.

Pipeline Efficiency

Two-phase pressure drops may be calculated using Equation 5. Various correlations have been developed for the relationship between X and ϕ.

The term ϕ is also related to E, the pipeline efficiency. The general flow equation may be written:

$$Q = \frac{38.7744\, T_o}{1{,}000\, P_o} \times \left[\frac{(P_1^2 - P_2^2)\, D^5}{L''\, S\, T\, Z} \right]^{0.5} \times \left(\frac{E^2}{f_g} \right)^{0.5} \quad (7)$$

so that the term $(E^2/f_g)^{0.5}$ represents the total frictional resistance of the pipeline. The term f_g represents the friction factor for gas in a dry pipe and E represents the efficiency when the pipe is partially filled with liquid.

Similarly the friction factor for two-phase flow would be (f_g/E^2). The pressure drop for gas flow is:

$$\Delta P_g = \frac{Q^2\, L'\, S\, T\, Z}{20{,}000\, D^5\, P_{avg.}} (f_g) \quad (8)$$

and the pressure drop for two-phase flow would be:

$$\Delta P_{TP} = \frac{Q^2\, L'\, S\, T\, Z}{20{,}000\, D^5\, P_{avg.}} \times \left(\frac{f_g}{E^2} \right) \quad (9)$$

Simplifying:

$$\Delta P_{TP} = \Delta P_g\, (1/E^2) \quad (10)$$

but,

$$\Delta P_{TP} = \Delta P_g\, \phi^2_{GTT} \quad (5)$$

so

$$\phi^2_{GTT} = 1/E^2 \quad (11)$$

and

$$E = 1/\phi \quad (12)$$

Flanigan[11] has proposed a two-phase pipeline efficiency correlation for the Panhandle equation.

$$Q = 0.43587 \left(\frac{T_o}{P_o} \right)^{1.07881} \times \left(\frac{P_1^2 - P_2^2}{Z\, T\, L''} \right)^{0.5394} \times \frac{D^{2.618}}{S^{0.4606}}\, E \quad (13)$$

If this Panhandle equation is used the relationship between E and ϕ is:

$$E_P = 0.9/\phi^{1.077} \quad (14)$$

Flanigan's values[12] of E_G as reported in his paper[11] are adjusted for use with the Grizzle gas-pipeline slide rule.[13]

$$E_P = 0.92\, E_G \quad (15)$$

and correspondingly

$$E_G = 0.98/\phi^{1.077} \quad (14a)$$

It should be noted that the volumes calculated by the Grizzle slide rule sl ould be corrected for compressibility factor.

Design Equations

In designing two-phase pipelines the flow pattern should first be determined from Fig. 3. All quantities and properties of the liquid or gas phases should be calculated at pipeline pressure and temperature. Metered gas quantity will decrease due to solution in the oil and the stock tank oil quantity will increase.

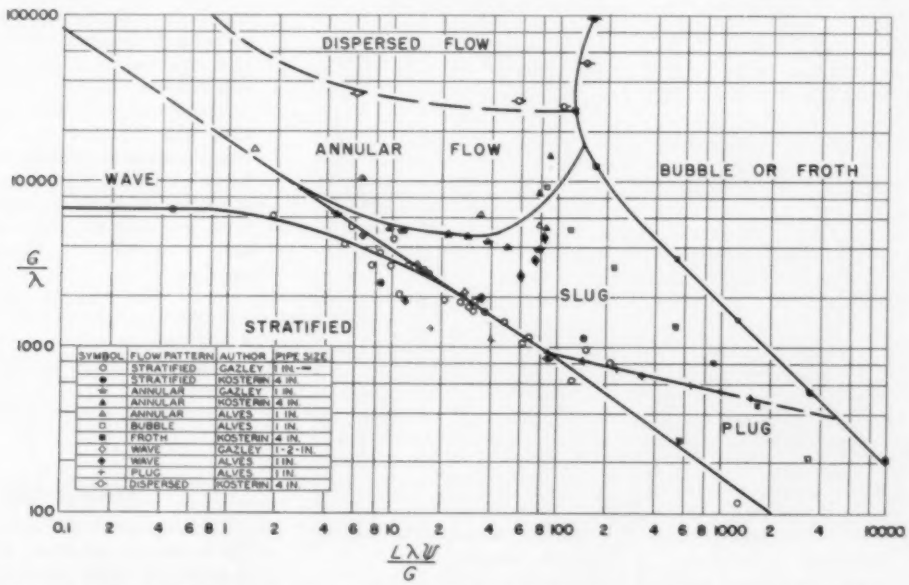
Fig. 4 shows the change in properties of a 36°-API-gravity oil at various pipeline pressures. Equations 8 and 16 will be useful in estimating pressure drops for the separate oil and gas phases for use in calculating X, Equation 1.

$$\Delta P_L = \frac{f\, L'\, (\text{bbl./day})^2\, (\text{lb./gal.})}{181{,}916\, D^5} \quad (16)$$

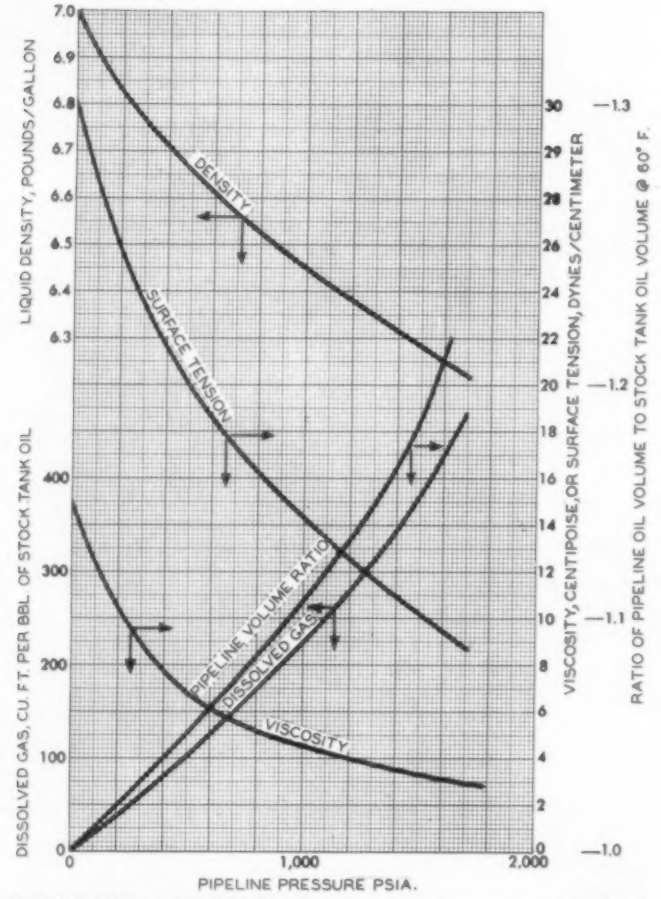
It is suggested that the following equations be used for ϕ_{GTT}.

Froth or bubble flow:

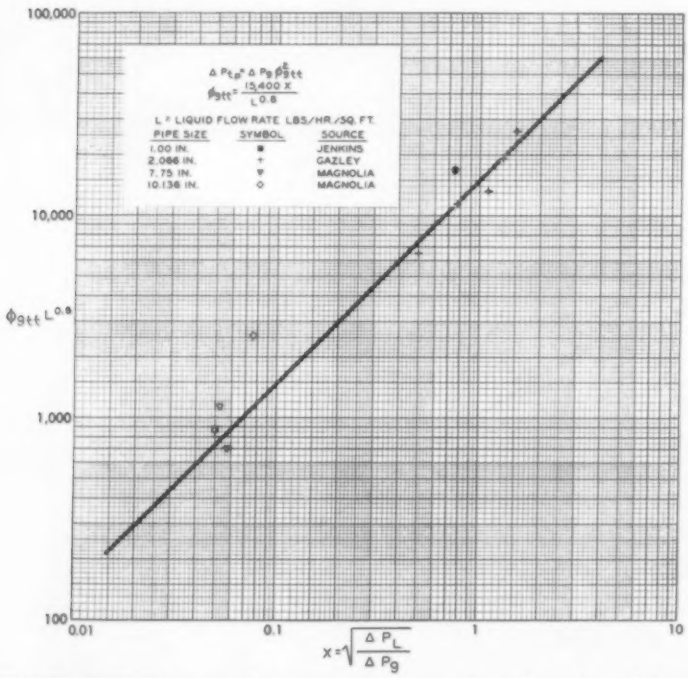
$$\phi_{GTT} = 14.2\, X^{0.75}/L^{0.1} \quad (17)$$


DISPERSED FLOW
ANNULAR FLOW
WAVE
BUBBLE OR FROTH
SLUG
STRATIFIED
PLUG
G/λ
LλΨ/G
100000
10000
1000
100
0.1
10000
SYMBOL | FLOW PATTERN | AUTHOR | PIPE SIZE
○ | STRATIFIED | GAZLEY | 3 IN.—
● | STRATIFIED | KOSTERIN | 4 IN.
☆ | ANNULAR | GAZLEY | 1 IN.
▲ | ANNULAR | KOSTERIN | 4 IN.
△ | ANNULAR | ALVES | 1 IN.
□ | BUBBLE | ALVES | 1 IN.
■ | FROTH | KOSTERIN | 4 IN.
◇ | WAVE | GAZLEY | 1-2-IN.
◆ | WAVE | ALVES | 1 IN.
+ | PLUG | ALVES | 1 IN.
◇ | DISPERSED | KOSTERIN | 4 IN.

FLOW-PATTERN REGIONS in two-phase flow may be defined in terms of mass velocity of gas phase and ratio of liquid and gas mass velocities. Fig. 3.


LIQUID DENSITY, POUNDS/GALLON
DISSOLVED GAS, CU. FT. PER BBL. OF STOCK TANK OIL
VISCOSITY, CENTIPOISE, OR SURFACE TENSION, DYNES/CENTIMETER
RATIO OF PIPELINE OIL VOLUME TO STOCK TANK OIL VOLUME @ 60° F.
DENSITY
SURFACE TENSION
PIPELINE VOLUME RATIO
DISSOLVED GAS
VISCOSITY
PIPELINE PRESSURE PSIA.

PIPELINE-LIQUID PROPERTIES change with pressure in two-phase flow. Fig. 4.



STRATIFIED FLOW in two-phase systems seems to be independent of line size. Fig. 5.

Plug flow:

$$\phi_{GTT} = 27.315\ X^{0.855}/L^{0.17} \quad (18)$$

Stratified flow:

$$\phi_{GTT} = 15{,}400\ X/L^{0.8} \quad (19)$$

See Fig. 5 for a correlation of stratified flow data.

For wave flow, use the Huntington, Schneider, and White correlation shown in Fig. 6.

Slug flow:

$$\phi_{GTT} = 1{,}190\ X^{0.815}/L^{0.5} \quad (20)$$

Annular flow:

$$\phi_{GTT} = (4.8 - 0.3125\ D) \times X^{0.343 - 0.021\ D} \quad (21)$$

Annular flow equation . . . This correlates data up to 10-in. pipe size fairly well. Above this size the equation begins to give an absurd answer. Until data are available on large pipe it is suggested that X be calculated for the larger size pipe to be installed but the value of D in the equation be set at 10 for pipes 10 in. and larger.

No equation is available for spray or fog flow. In the absence of a design equation it is suggested that the Martinelli correlation[2] be used to calculate the pressure drop and the answer multiplied by two. This suggestion is based on some of the data of Hoopes[14] and Alves.[7]

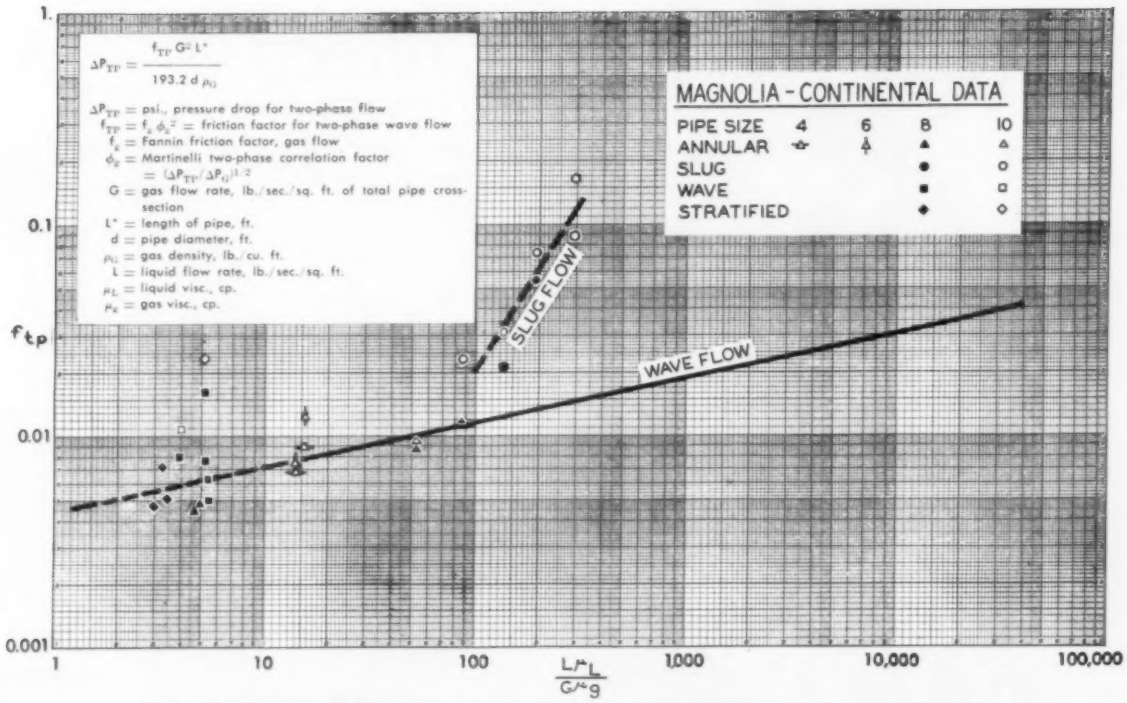
The pressure drop in gas-fluid catalyst lines reported by Zenz[15] is of interest in this regard. A. E. Dukler[16] at University of Houston is studying entrainment in the zone between annular and dispersed flow and a design equation may develop from his experiments.

These equations for ϕ_{GTT} may be used with Equation 5 for calculating two-phase pressure drop or they may be converted to pipeline efficiency and used with the appropriate equations to calculate gas capacity, Equation 7, or diameter, Equation 22 as required.

$$d = \left[\frac{L' Q^2 S T Z}{9{,}984\ (P_1 - P_2)(P_1 + P_2)} \right]^{0.2} \times \left(\frac{f_g}{E^2} \right)^{0.2} \quad (22)$$

Effect of Hills

The equations discussed so far are for horizontal pipelines. If the terrain is hilly, the liquid phase begins to accumulate in the valleys and the pressure drop increases. Equation 23



WAVE FLOW CORRELATION for two-phase work is also independent of line size. Fig. 6.

gives a method for correcting for hills.

$$\Delta P_{TPh} = \Delta P_{TP} \text{ (for horizontal pipe)} + N\, h\, F_e\, \rho_L / 144 \qquad (23)$$

ΔP_{TP} = calculated two-phase pressure drop for horizontal pipe, psi.
ΔP_{TPh} = calculated two-phase pressure drop for pipelines in hilly terrain, psi.
N = number of hills
h = average height of hills in feet
F_e = elevation factor from Fig. 7
ρ_L = density of liquid flowing in line, lb./cu. ft.
V = gas velocity in pipeline, ft./sec. (based on 100% pipe area) at pipeline pressure and temperature

In Magnolia's original paper on two-phase flow we suggested adding a liquid head equal to one-half the height of the hill to the pressure drop calculated by the horizontal flow equation or $F_e = 0.5$. This head should be added for each hill the line goes over.

Holdup . . . Fig. 2 shows the "holdup" relationship for horizontal pipe. Other conditions remaining constant, an increase in gas velocity lowers X and reduces holdup. An increase in liquid flow rate increases X and increases holdup.

Studies of inclined flow holdup and increased pressure drop of inclined two-phase flow made on laboratory equipment by Huntington, Brigham, and Holstein[17] and by Flanigan[11] and Baker[18] on field lines are summarized in Fig. 7.

Flanigan has more data at velocities below 10 ft. per second and his curve should be the most reliable in this range. His data are for a 16-in. pipeline. Huntington's data for a 2-in. pipe show an effect of liquid flow rate at velocities greater than 10 ft. per second. For design purposes Equation 24 is suggested for the present.

$$F_e = 0.00967\,(L)^{1/2}/V^{0.7} \text{ for } V > 10 \qquad (24)$$

For froth flow no correction for hills appears to be needed. More data are needed in the gas velocity range of 0.5 to 10 ft. per second with various liquid rates to determine how liquid rate affects F_e. Most operating two-phase gathering lines operate in the range of 1 to 15 ft. per second.

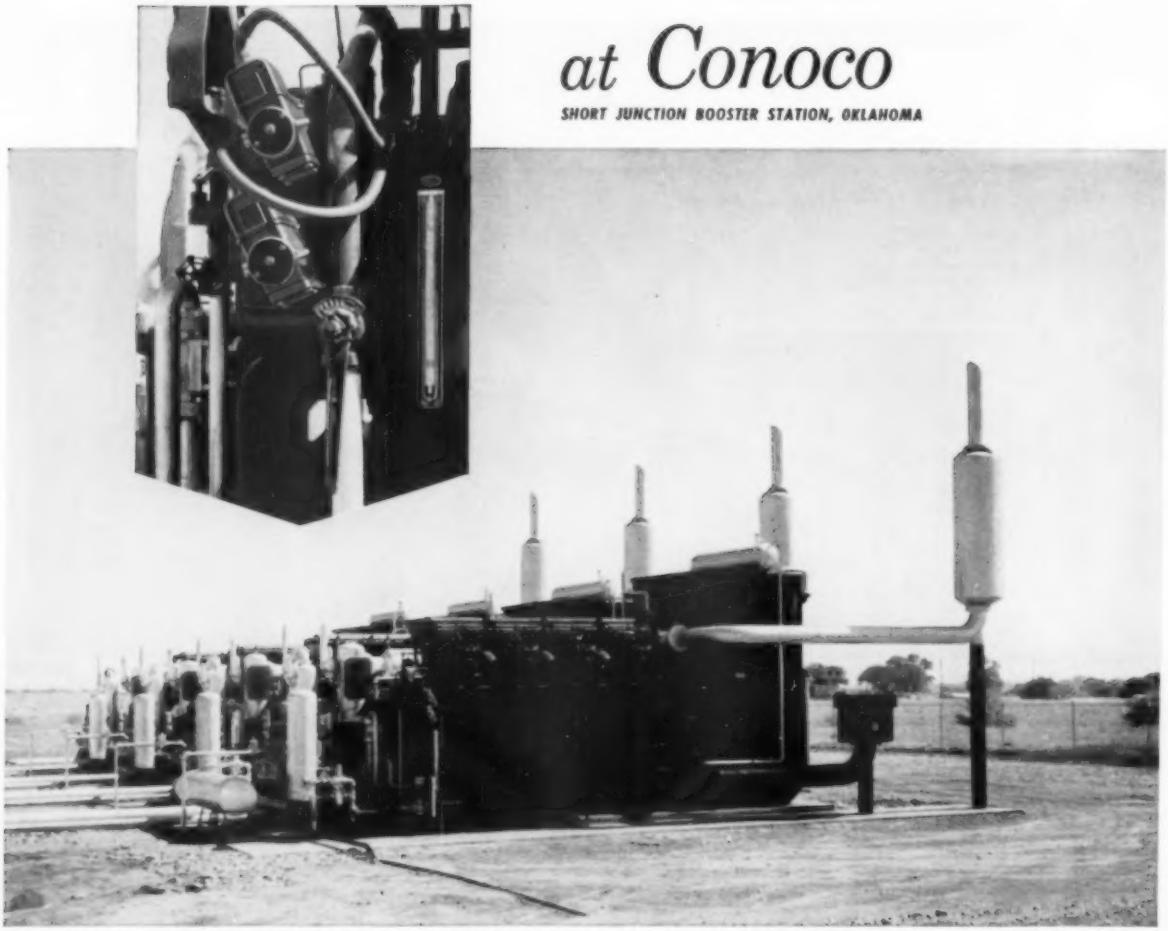
Effect of pressure . . . There is evidence that pressure affects ϕ_{GTT} in some way that is not accounted for by the Martinelli relationship. The equations for ϕ_{GTT} given above are based on data for atmospheric, 450, 700, and 1,000 psig. and appear to correlate all these data fairly well. As critical pressures are approached the value of ϕ_{GTT} may become only 50% of the predicted values. Fig. 8 indicates the magnitude of correction factors for ϕ_{GTT} for the flow of water and steam as it approaches the critical pressure of 3,206 psia.[19]

Comparison of equations . . . Many correlations have been proposed for two-phase pressure-drop calculations. Some of these are compared in Table 4. These calculated pressure drops are compared with the measured pressure drop in a 12-in. i.d. line 134,370 ft. long with an inlet pressure of 424.7 psia. and an outlet pressure of 319.7 psia. This line was passing 6,912 bbl. per day of 37°-API-gravity stock-tank oil and 3,191 M.s.c.f. per day of 0.7°-gravity gas at a temperature of 60° F.

At pipeline conditions the oil volume was 7,140 bbl. per day and the gas volume 2,569 M.c.f.d. Pipeline-oil density was 6.869 lb. per gallon, viscosity 4.2 cp., and surface tension 22.3 dynes per centimeter. The gas density was 1.45 lb. per cu. ft. and the viscosity 0.0105 cp. This line was operating in the slug flow patterns.

It will be seen from Table 4 that all the proposed correlations missed the experimental value of pressure drop by 26% or more. Also they did not agree among themselves very well. These results are not very encouraging to designers.

The lack of agreement among the various equations results from the fact that each experimenter worked with a limited amount of data—prac-



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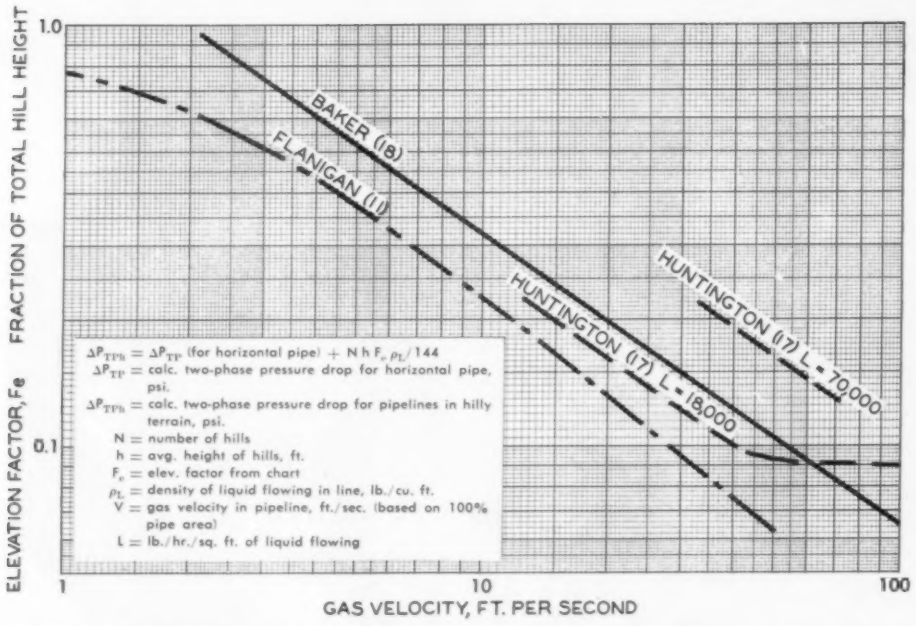
ELEVATION FACTOR, Fe FRACTION OF TOTAL HILL HEIGHT
1.0
0.1
BAKER (18)
FLANIGAN (11)
HUNTINGTON (17) L = 70,000
HUNTINGTON (17) L = 18,000
$\Delta P_{TPh} = \Delta P_{TP}$ (for horizontal pipe) + N h F_e ρ_L/144
ΔP_{TP} = calc. two-phase pressure drop for horizontal pipe, psi.
ΔP_{TPh} = calc. two-phase pressure drop for pipelines in hilly terrain, psi.
N = number of hills
h = avg. height of hills, ft.
F_e = elev. factor from chart
ρ_L = density of liquid flowing in line, lb./cu. ft.
V = gas velocity in pipeline, ft./sec. (based on 100% pipe area)
L = lb./hr./sq. ft. of liquid flowing
1
10
100
GAS VELOCITY, FT. PER SECOND

INCLINED-FLOW HOLDUP and increased pressure drop due to pipeline elevation may be correlated with elevation factor and gas velocity. Fig. 7.

tically none of it on large-size pipe. Not much improvement may be expected until data from large-diameter operating lines is generally available.

Nomenclature

D = inside diameter of pipe, in.

E = pipeline efficiency as a fraction in the general equation.

E_p = pipeline efficiency as a fraction in the Panhandle equation.

E_G = pipeline efficiency as a fraction for the Grizzle slide rule.

F_e = elevation factor from Fig. 7.

f = friction factor (chemical engineering units).

f_g = friction factor for gas.

f_{TP} = friction factor for a two-phase mixture.

G = mass velocity of the gas phase, pounds per hour per square foot of total pipe cross-section area.

H = holdup factor, relative gas pressure drop due to liquid holdup.

h = average height of hills in feet.

K = height of waves in liquid surface expressed as equivalent height in inches of rough uniform sand grains coating the wall of the pipe.

L = mass velocity of the liquid phase, pounds per hour per square foot of total pipe cross-section area.

L′ = length of pipeline in feet.

L″ = length of pipeline in miles.

N = number of hills the pipeline passes over.

P = pressure, psia.

P_1 = pipeline inlet pressure, psia.

P_2 = pipeline outlet pressure, psia.

P_b = pressure base for measurement of gas—usually 14.65 psia.

ΔP_G = pressure drop for the gas-phase flowing in pipe. The full cross-sectional area of the pipe is used in evaluating the pressure drop, psi.

ΔP_L = pressure drop for the liquid phase flowing in pipe. The full cross-sectional area of the pipe is used in evaluating the pressure drop, psi.

ΔP_{TP} = pressure drop for the two phases flowing simultaneously, psi.

ΔP_{TPh} = two-phase pressure drop in hilly terrain.

Q = gas flow rate, thousands of cubic feet per day measured at 60° F. and 14.65 psia.

R = relative gas pressure drop due to wave roughness.

$R^{0.32}$ = Flanigan's parameter = $(\text{bbl./M.M.c.f.})^{0.32}$.

R_e = Reynolds number $= \dfrac{D\,G}{12\mu\ 2.42}$

S = specific gravity of flowing gas (air = 1).

T = absolute temperature of gas flowing, °F. + 460.

T_b = base absolute temperature for gas measurement usually 60 + 460 = 520.

V or U = superficial gas velocity in pipeline, gas volume at pipeline temperature and pressure, area for flow the entire pipe cross-section.

$X = [\Delta P_L\ (\text{psi.})/\Delta P_G\ (\text{psi.})]^{1/2}$.

Z = compressibility factor of flowing gas.

$\phi_{GTT} = (\Delta P_{TP}/\Delta P_G)^{0.5}$ where both liquid and gas phases are in turbulent flow.

TABLE 4—COMPARISON OF TWO-PHASE PRESSURE DROP CORRELATIONS

Author—	Ref. No.	Pipe size used in experiment	Per cent deviation	Two-phase pressure drop
Test on operating pipeline		12	0	105
Baker	3	1-10	−26	78
Martinelli*	2	1	−44	59
Schneider, White, and Huntington*	20	1- 2	−50	53
White and Huntington*	23	1- 2	−50	53
Capenegro	21	4- 8	−69	33
Flanigan	11	4-10	−68	34
Reid	22	4- 6	−64	37
Baxendell	24	4- 6	−78	23
Chenoweth and Martin	25	1.5- 3	−70	31
Bertuzzi, Tek, and Poettmann	26	0.5- 2	−86	14
Chisholm and Laird	27	1	−38	65

*These authors specifically state that their correlations do not apply to slug flow.

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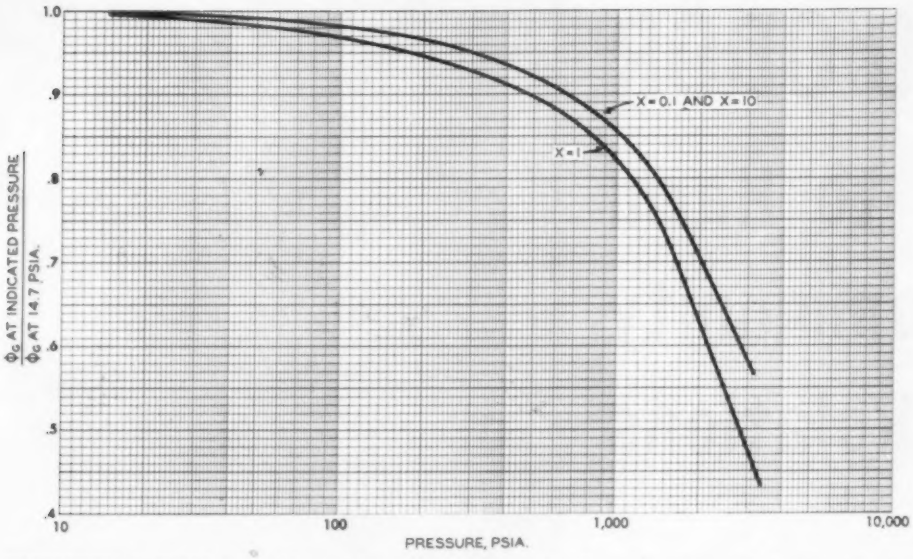

CORRECTION FACTORS for holdup and roughness effects for flow of water and steam and mixture approaches critical pressure. Fig. 8.

ρ_G = density of gas phase, lb. per cu. ft.

ρ_L = density of liquid phase, lb. per cu. ft.

$\lambda = [(\rho_G/0.075)(\rho_L/62.3)]^{1/2}$.

$\psi = (73/\gamma)[\mu_L(62.3/\rho_L)^2]^{1/3}$.

γ = surface tension of liquid phase, dynes per centimeter.

μ_L = viscosity of liquid phase, centipoise.

μ_G = viscosity of gas phase, centipoise.

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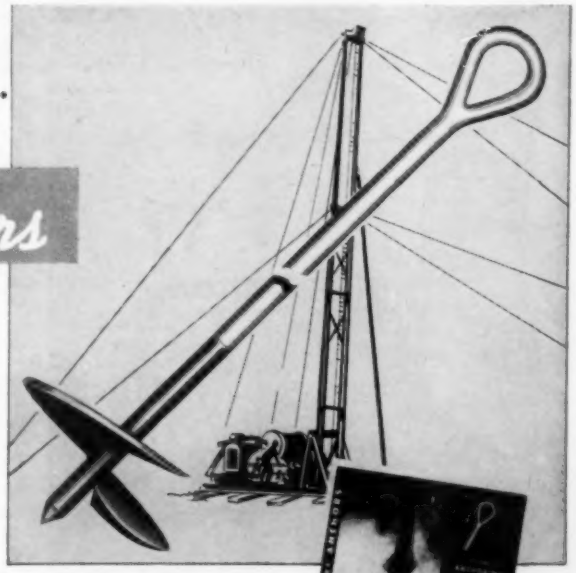

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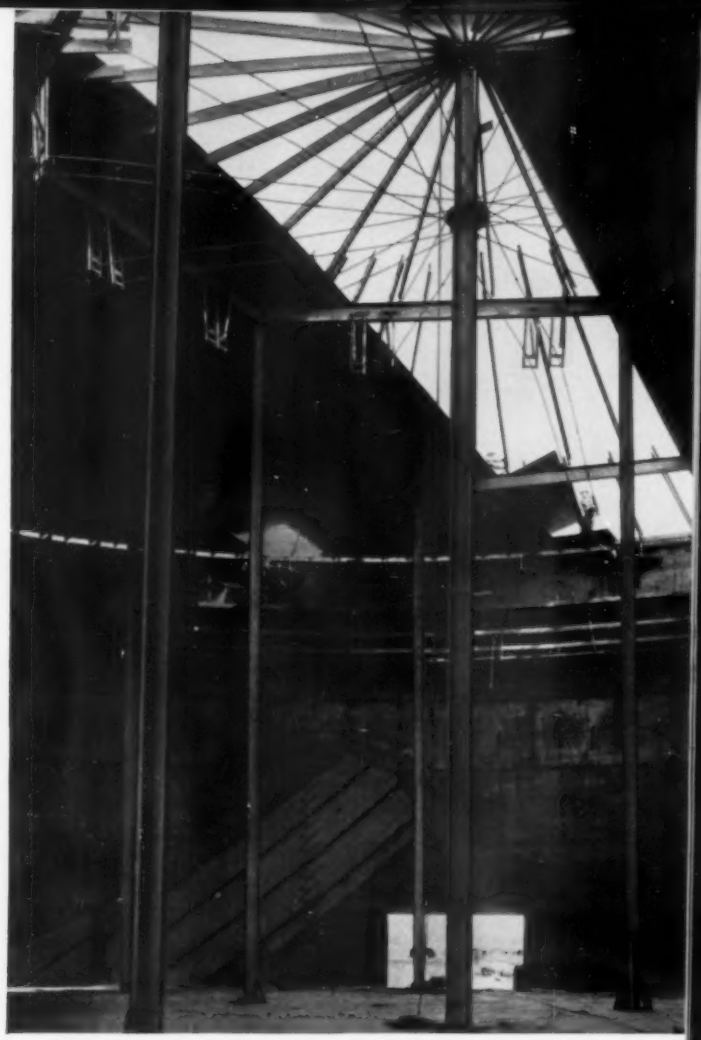

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BOOK

COMPETITION IN OIL—THE GULF COAST REFINERY MARKET, 1925-1950, by Daniel C. Hamilton, manager of the economics department of Atlantic Refining Co. and lecturer in economics at the University of Pennsylvania. Published by Harvard University Press, Cambridge, Mass.

This monograph is a revision and expansion of a doctoral dissertation in the department of economics at Columbia University. It is a systematic study of the Gulf Coast market structure and behavior.

The author starts with a definition of the Gulf Coast refinery market, including a discussion of its structural features. He covers prices and price reporting, types of buyers and sellers, and the degree of refinery concentration in the area. Some space is given to efficiency of plants and adequacy of capacity.

Hamilton has calculated refinery realization from a barrel of crude for the period from 1925 through 1950.

In the last chapter, the author discusses competition in the Gulf Coast refinery market. His general conclusion is that while this market is not the epitome of pure competition, the available evidence does suggest a persistant downward pressure on processing costs and margins.

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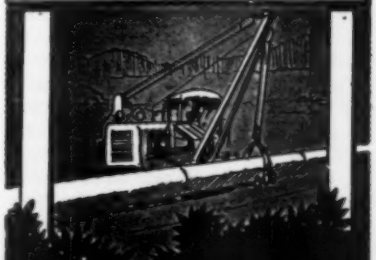

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▶▶▶ Among the Drilling Contractors

Five contractors share in 17-well Swan Hills program

FIVE CONTRACTORS are sharing in 17 drilling contracts Home Oil Co., Ltd., has awarded in a major development program getting under way in the new Swan Hills field, 150 miles northwest of Edmonton, in North Central Alberta, western Canada.

The drilling schedule calls for four of these contractors to drill four wells each. Each will use one rig, drilling the wells consecutively.

The fifth contractor, Can-Tex Drilling Co., Ltd., so far is under contract only for one well. This is to an exploratory test at a long stepout location, exact spot of which has not been determined definitely.

First locations of each of the first four contractors are for field development wells in and close around the present productive area of Swan Hills field proper. Contractors on these are Peter Bawden Drilling, Ltd., Regent Drilling Co., Ltd., General Petroleums of Canada, Ltd., and Hi-Tower Drilling Co., Ltd. All headquarter at Calgary except Regent Drilling Co., which calls Edmonton home.

Home Oil Co., the operator, already is making plans for additional development and expects to award more contracts within 6 weeks. These contracts will be governed by results of the first round of wells.

Swan Hills field, rated as one of the most important discoveries in Canada in recent years, was opened in 1957. Production is from the Beaver Hill Lake formation of Middle Devonian age found at depths below 9,000 ft. This is Canada's first production from that formation which now extends along an 80-mile trend. Five field wells and one stepout well already have been completed. All have had initial flows above 1,000 bbl. of oil per day.

Who's getting the drilling contracts

Larco Drilling Co., Jackson, Miss., has a rig working for Gulf Oil Corp. on a wildcat location 3 miles southeast of Puckett, in the southwestern corner of Smith County, South Mississippi. Location is on Gulf's Puckett Unit in 30-3n-6e. Plans call for a 12,600-ft. test with the Lower Cretaceous-Hosston zone as the objective.

Pronto Drilling Co., San Antonio, has moved the rig it has been operating in northwestern Dimmit County, Texas, to the Batesville area of northeastern Zavala County. There it is under contract to W. H. McGarr for a 4,000-ft. test (1-A Bartlett) near a gas-discovery well this operator drilled a year ago. In Dimmitt County, which adjoins Zavala on the south, the rig was on a 3,000-ft. dry hole drilled for V. A. Brill.

Buzzini Drilling Co., San Antonio, is getting started on a deep Edwards well it has contracted to drill for Renwar Oil Corp., of Corpus Christi, in the Fashing area, on the Atascosa-Karnes county line, in Southwest Texas. It is Renwar's first operation in the area. Buzzini, however, has been active there for some time drilling for Gulf Oil Corp. and associates. Renwar's job is at 1 Pollock, on the Atascosa County side of the line. Drilling in the area is to 11,000 ft.

Richardson & Bass, Dallas, has another deep drilling job lined up for Signal Oil & Gas Co. in the South Lake Charles area of southeastern Calcasieu Parish, in southwestern Louisiana. It is an east extension test, about 4,000 ft. from the nearest well. Location is at 1 Barbe-Gayle unit, in 10-11s-8w, with contract to 14,000 ft. Richardson & Bass have just completed Signal's fifth productive well in the immediate area. Production is gas and condensate from sands below 13,000 ft.

Clegg & Hunt, Houston, have a new deep contract operation at a wildcat location 3 miles west of the old Iberia field, in Iberia Parish, South Louisiana. It is for W. L. Pickens at 1 Bernard, in 22-12s-7e.

Grey Wolf Drilling Co., Houston, is making hole on a new drilling contract it has with Texas Eastern Transmission Co. in Galveston County, Texas Gulf Coast. It is a 10,500-ft. job. Location, at 1 Henck, in the William H. Jack Survey, is about 2 miles southwest of Hitchcock.

Chance Drilling Co., Houston, is on a new Monsanto Chemical Co. operation in Matagorda County, Texas Gulf Coast. It is a 11,500-ft. wildcat test ½ mile east of El Maton, in the northwestern part of the county. Location is listed as 1 Fay in the Thomas Jamison Survey.

Arnold Well Service Co. is the contractor on a projected 7,000-ft. wildcat Sonnit Petroleum Co. is starting south of Edroy, in western San Patricio County, Central Texas Gulf Coast area. Location is 2 miles north of Odom field.

Earl Wakefield, Wichita, Kans., has taken on a wildcat drilling job in southern Red Willow County, in southern Nebraska, about 6 miles from the Kansas line. Contract is with Bondville Oil & Gas Co., of David City, Neb. It calls for a 3,600-ft. Pennsylvanian test. Location is 7½ miles southeast of McCook. Nearest production is a small pumping discovery well, drilled in 1957, about 8 miles southwest.

Drilling & Exploration Co., Los Angeles, has a new deep operation under way in the Newhall-Potrero area in Los Angeles County, California, where it is drilling for Sunray Mid-Continent Oil Co. The well, No. 148-7, in 26-4n-17w, is set up to go to 13,200 ft. Location is off the north side of the field.

Rowan Drilling Co., Houston, has contracted for a 12,000-ft. test to be drilled for Quintana Petroleum Co. at a wildcat location 1½ miles east of LaRose field, 25 miles down Bayou Lafourche from Raceland, in Lafourche Parish, southeastern Louisiana. Location is listed as 1 Fairbanks, in 37-17s-21e.

Hunt Drilling Co., Corpus Christi, is getting under way on a 12,500-ft. test it has contracted to drill for Monsanto Chemical Co. in Matagorda County, Texas Gulf Coast. Its location, at 1 Cornelius, is just east of Elmaton, 6 miles east of Blessing, in the western part of the county.

J. C. Trahan Drilling Co., New Orleans, has the contract on another deep wildcat Shoreline Drilling Co., of Shreveport, is drilling in the southeastern coastal area of Louisiana. Its latest job is a 13,000-ft. test to be drilled south of East Golden Meadows field, in LaFourche Parish. Trahan is getting well down on a 14,000-ft. test it is drilling for Shoreline southwest of Gibson, in northern Terrebonne Parish.

General Electric Announces the All-new Type KOF Motor—Only Known Motor with Electrical Characteristics Designed Specifically for Oil Well Pumping

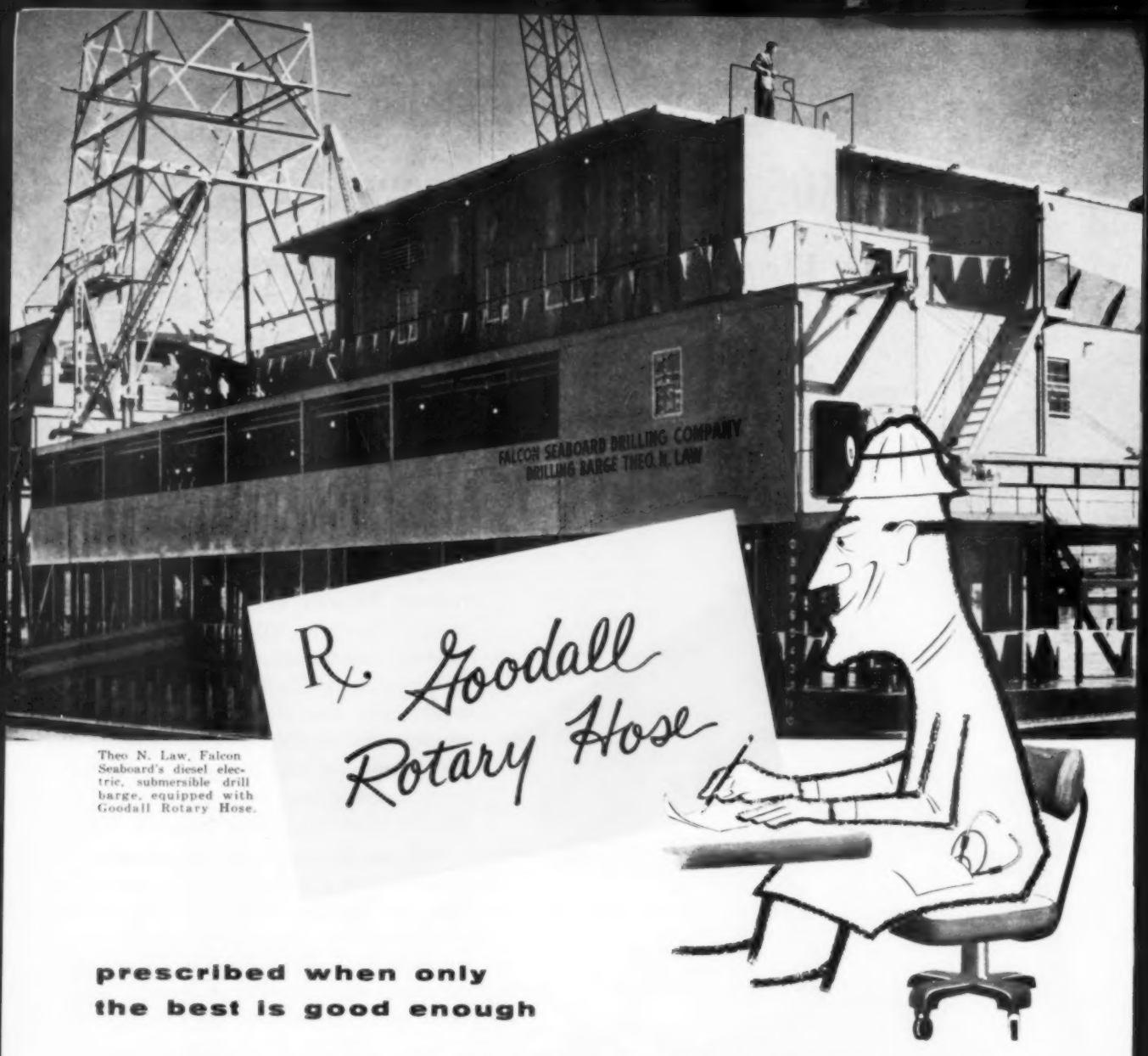
NEW DESIGN GIVES 8 TO 10 PERCENT SLIP, 400 PERCENT STARTING TORQUE, LOWER KWH PER BARREL

General Electric's new oil well pump motor — the Type KOF — features new electrical characteristics specially designed to meet the unusual demands of an oil rig's highly cyclic load. Highest slip—8 to 10 percent—and highest starting torque—400 percent—of any available oil well pumping motor, smooth out pulsating load peaks and overcome unusual loads.

Now you can select a motor designed *specifically* to provide optimum performance and economy on oil well pumping applications. For the full story of this new motor development, contact your nearby Apparatus Sales Office or distributor: or write direct to Section 899-3, General Electric Company, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC



Theo N. Law, Falcon Seaboard's diesel electric, submersible drill barge, equipped with Goodall Rotary Hose.

R. Goodall Rotary Hose

prescribed when only the best is good enough

For example, Falcon Seaboard could not afford less than the best rotary hose for their shallow-water drill barge. Consequently, Goodall Rotary Hose was selected to be used on the barge's 1500 hp mud pump—the largest on the market. The Theo N. Law was still on location and drilling beyond 14,987 feet when last reported. Guaranteed Goodall Rotary Hose continues to give dependable performance.

For a rotary hose that will withstand the highest drilling pressures produced on any rig now in use—specify Goodall. It's good economics, because only Goodall hose has these outstanding features:

The Barney Coupling · The Goodall Safety Clamp · The Goodall Repair Service
The Goodall One-Year Guarantee

GOODALL RUBBER COMPANY

TRENTON, N. J.

Goodall Rubber Company of Texas: Houston and Odessa

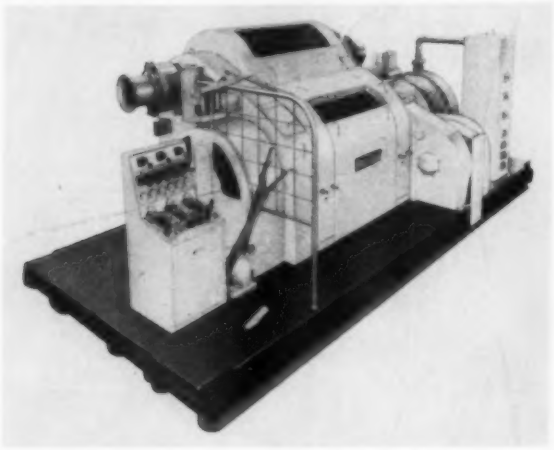
Goodall Rubber Company: New York, Philadelphia, Pittsburgh, Chicago, Denver, St. Paul, Detroit, San Francisco, Los Angeles, Seattle, Salt Lake City, Portland.

Export: Goodall Rubber Company, Trenton, N. J.

Stocking Distributors: Texas and Louisiana — Houston Oil Field Material Co., Wilson Supply Co., Hunt Tool Co., Heap Equipment Company, Iverson Supply Co.

Available through all qualified supply stores.

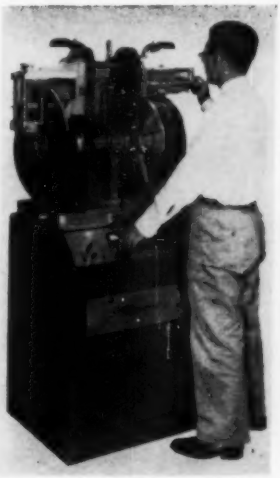
This week's SHOWCASE features . . .



New draw works rated at 900 hp.

. . . built for drilling in the 7,000 to 12,000-ft. range. Compact and relatively light weight, the Model 760 draw works has a highly functional console that provides full air control of clutching, shifting, and engine throttling.

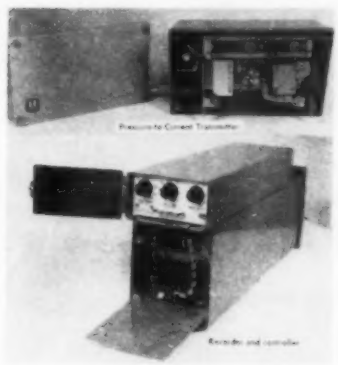
A pushbutton compounding arrangement on the control panel permits either hand or foot throttle control of the engines. **Write or call: Oil Well Supply Div., United States Steel Corp., Box 478, Dallas 21, for details on the 760 draw works.**



Seismic magnetic media transcriber

. . . permits standardization of all types of magnetic tapes and disks now in popular use, the maker claims. The Omnitape magnetic record transcriber permits you to transcribe the seismic data from one major tape or magnedisk to any other major tape or disk without loss of record fidelity. This is accomplished with a single playback head, transcribing one trace at a time to a single recording head. The heads automatically move over to the next trace on the respective tapes.

This automatic moveover means an operator can transcribe from a frequency-modulation recording with a $\frac{7}{16}$-in. spacing to a pulse width recording with $\frac{1}{4}$-in. spacing between the track, or from direct to frequency modulation or from pulse width to direct.



New electronic control instruments

. . . for petrochemical plants and refineries come in 20 major types and allow integration of control systems with data handling, computers, and other advanced instrumentation. Units of the minaturized system called Electrik Tel-O-Set, can be linked to a variety of pneumatic instruments and control schemes.

Employing transistors, the instruments eliminate the need for a power source at field-mounted instruments.

A simple two-wire system transmits as electric signals the process data from the sensing instruments. Building-block design allows interchanging units or subassemblies and the addition or removal of auxiliary devices. A basic system consists of a transmitter, receiver, controller, and actuator or final control element. **Write or call: Minneapolis-Honeywell Regulator Co., Wayne & Windrim Avenues, Philadelphia 44, for details on Electrik Tel-O-Set control instruments.**

Send this Showcase Coupon

to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

.....

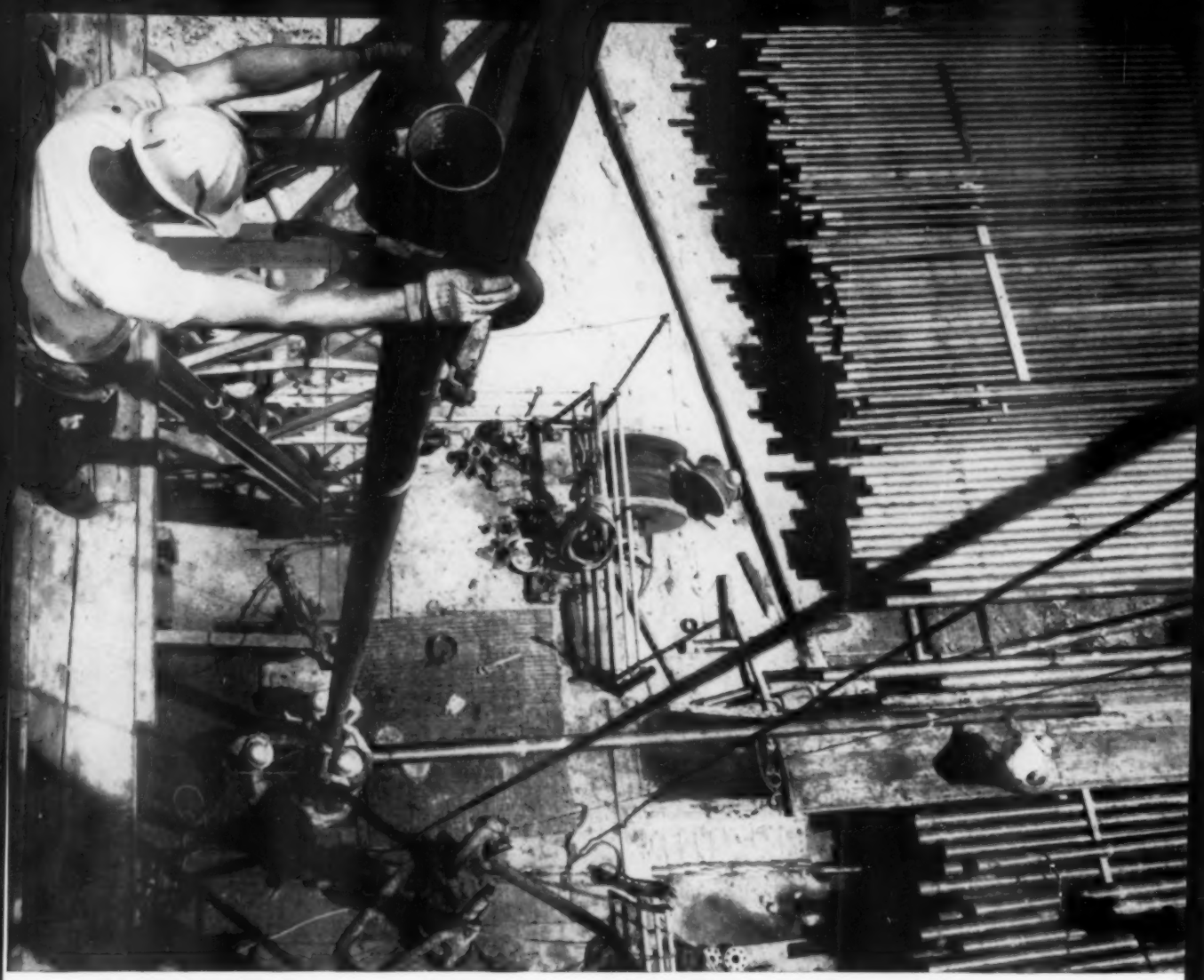
Described in OIL AND GAS JOURNAL - Issue of **Nov. 10, 1958**

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....



Running Casing calls for teamwork between the man on the stabbing board and the crew below.

Here's Where It Started...

Pittsburgh Steel's oil country goods still being supplied to oil, gas wells in area where world's first well was drilled

Experience pays off in oil and gas fields everywhere. But in Pennsylvania, oil and gas men log their experience by generations instead of by years.

And well they might. Col. Edwin Drake started it all in the Keystone State back in 1859. Since then, Pennsylvania has built a reputation as producer of one of the world's finest oils.

Today, with secondary recovery methods giving new life to old oil wells, the venerable oil industry shares a new importance with the continuing production of natural gas.

Drilling for gas in Pennsylvania's rugged hills is no job for amateurs. Once you've solved the problem of moving your rig and equipment across rugged hills and valleys, you've still got scores of problems to cope with.

• **Need Finest Materials**—One is gas pressure. Producers know gas pressure is something you deal with right the FIRST time. That's why they demand the finest in oil country goods.

That's one big reason why the independent distributor serving this pioneer Bradford Field offers his customers seamless drill pipe, casing and tubing produced by Pittsburgh Steel Co.

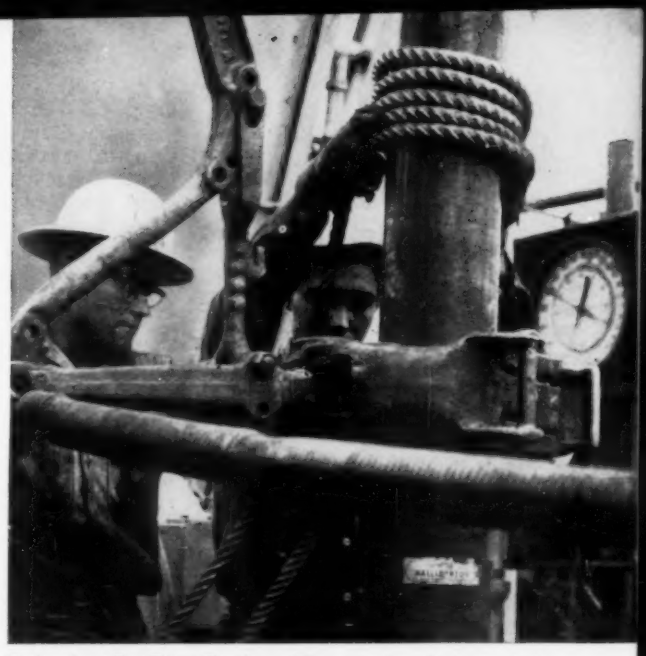
Now well into his second half century of existence, this Mr. Independent started back in 1907 when the oil and gas fields of Western Pennsylvania were really booming.

Today he's still in business in that area and has extended his operations westward to follow the new discoveries. Now his 15 branches and five shops do a good job of covering the country's oil and gas fields.

With this backlog of experience, Mr. Independent knows materials. He has a vast store of knowledge to share with customers.

He handles oil country goods made by Pittsburgh Steel Co. because they

Inspecting Casing: l. to r., Dale Croasmun, engineer for Manufacturers Light and Heat Co.; Mark Wagner, independent distributor's representative; Peter E. Douylliez, Pittsburgh Steel field engineer; and S. M. McMahon of Pittsburgh Steel.



Spinning In The Casing. The run has just started and roughnecks are threading the second joint into the first. More than 200 joints of Pittsburgh Steel Co. casing were used on this hole. Total depth was 7,242 ft.

help him meet the credo he established for his company. That credo is to offer "only the highest quality oil and gas well supplies and to give complete customer satisfaction through the best possible service."

The quality of the product he handles was demonstrated on the gas well pictured here in the Bradford Field where casing is all-important.

Because natural gas roars up the casing under pressures ranging from 2,000 to more than 4,000 pounds per square inch, casing is carefully tested in the hole before drilling continues on to pay.

• **Casing Passes Test**—On this well after drilling to 7,200 feet, operations were halted an estimated 40 feet from pay. Then Pittsburgh Steel's seven-inch J55 seamless casing was run into the 7,200-foot hole, cemented and tested.

This casing was run between noon and midnight without any delays caused by improper or damaged threads or other casing imperfections.

Behind that success was an effective combination of mill and distributor. The casing was of high, uniform quality because the skilled steelmakers and the experienced men in the Pittsburgh Steel pipe mills took the pains necessary to make sure that *every* joint met specifications.

The distributor had a big role, too.

Service rendered by the independent distributor in the Bradford Field is typical. In this area, not far from the world's first commercial oil well, independent distributors have built a solid reputation for good products, dependable service and a willingness to do more than they are asked to do.

In Western Pennsylvania's older fields, for example, secondary recovery methods have been developed to a fine art to help give new life to old wells.

Because the Mr. Independent who serves oil and gas men in the Bradford area has worked on hundreds of secondary recovery installations, he and his men have learned a lot which they're more than eager to pass on to drillers and well owners.

• **Something Special**—Like all the independent distributors listed here, this Mr. Independent has something special to offer oil and gas men . . . dependable casing, tubing and drill pipe that is supplied and serviced by men who have a real stake in the welfare of their customers.

These independents feel they are allies to the men who buy their oil country goods. The independent distributor is just that—independent. He sinks or swims according to how well his customers do.

So, tie in with Mr. Independent. He's really working for you. When you need oil country goods, pick up your phone and call the Pittsburgh Steel Co. distributor nearest you.

Distributor Home Offices

Bradford Supply Company
Bradford, Pennsylvania

Buckeye Supply Company
Zanesville, Ohio

Cardwell Manufacturing Co.
Wichita, Kansas

C. W. Cotton Supply Company
Tulsa 5, Oklahoma

Franklin Supply Company
Chicago 5, Illinois

Houston Oil Field Material Co.
Houston, Texas

Industrial Supply Company
Wichita Falls, Texas

Iverson Supply Company
Tulsa, Oklahoma

Longhorn Supply Co., Inc.
Houston 14, Texas

Lucey Expert Corporation
New York 7, New York

Lucey Products Corporation
Tulsa 19, Oklahoma

McJunkin Corporation
Charleston 22, West Virginia

Midland Supply Company
Wichita 7, Kansas

Mountain Iron & Supply Co.
Wichita 2, Kansas

Murray Brooks, Incorporated
Lake Charles, Louisiana

The Producers Supply & Tool Co.
Fort Worth 2, Texas

Production & Refining Equipment Company
Odessa, Texas

Sandy Supply Company
Wooster, Ohio

Southwest Supply Company
Pittsburgh, Pennsylvania

Superior Iron Works & Supply Co.
Shreveport, Louisiana

Western Supply Company
Tulsa 1, Oklahoma

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

District Sales Offices

Atlanta, Chicago, Cleveland, Dallas, Dayton, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Tulsa, Warren, Ohio

Why the Barclay's
EXECUTIVE SUITE PLAN
is so much more important to business concerns today

By leasing an apartment at The Barclay on an economical year 'round basis, you'll be assured of these definite advantages:

1 Guaranteed accommodations, even during crowded periods, for your key executives and important customers.

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3 Convenient for confidential "away-from-the-office" meetings, etc.

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Tom Kane, *General Manager*
A REALTY HOTEL
Harry M. Anholt, *President*

Easily operated by semiskilled personnel, the Omnitape requires less than 3 minutes for transcription of any prerecorded tape to any other tape. **Write or call: Hale Instruments, Inc., P. O. Box 7487, Houston, for details on Omnitape.**

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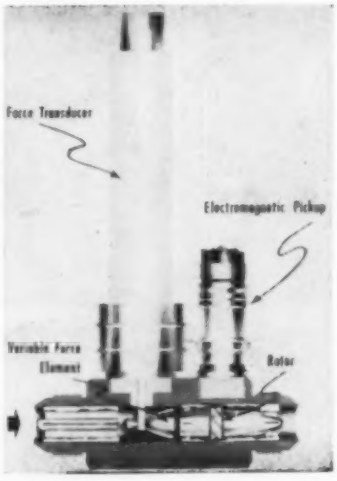

Mass flowmeter accuracy is high

. . . and it eliminates the need for two separate measuring instruments, operator adjustments, or sampling equipment, the maker claims. Compact and lightweight, it has only one moving part. Accuracy is ± 1% of instantaneous rate.

A variety of liquids can be handled at flow rates to 1 million lb. an hour with the meter. It consists of two hydraulically matched metering components, a variable-force element, and a volumetric element. All are in the same meter body. **Write or call: Fischer & Porter Co., 931 Jacksonville Road, Hatboro, Pa., for details on mass flowmeter.**

•

Gas-powered instrument clock

. . . can be used as either original or replacement equipment on all makes and types of recording instruments to replace spring-wound clocks. The maker claims it delivers a constant power output of more than 20 times that of spring-wound clock mechanisms. Called the Gasclok power drive, it can be used with instruments requiring chart records of from 1 hour to 30 days. These include integrating orifice

G-B SNAP*ON DISTRIBUTORS
(See ad on facing page)

ALBUQUERQUE, Mt. States Insulation Co.
AMARILLO, McDonald Engineering & Insulating Co.
ATLANTA, Ga., Reynolds Aluminum Supply Co.
BALTIMORE, Md., Leroy Insulation Co.
BILLINGS, Mont., Big Horn Supply, Inc.
BIRMINGHAM, Ala., Shook & Fletcher Supply Co.
Reynolds Aluminum Supply Co.
BOSTON, Homans-Kohler, Inc.
BUFFALO, Industrial Insulation Sales, Inc.
CHARLESTON, W. Va., Baldwin Asbestos Products Co.
CHARLESTON HEIGHTS, S. C., Stafford Insulation Co.
CHICAGO, E. C. Carlson Co.
CLEVELAND, The Miles Materials Co.
COLUMBUS, Santeler Brothers
CORPUS CHRISTI, Precision Insulation Co.
DALLAS, Insulation Supply Co., Inc.
Payne-Ladewig, Inc.
DAVENPORT, Republic Electric Co.
DENVER, Gene Wright Lumber Co.
DES MOINES, Iowa Asbestos Co., Inc.
EL PASO, Insulation Specialties Co.
EVANSVILLE, Ind., George Koch Sons, Inc.
FT. SMITH, Ark., Gunn Distributing Co.
FT. WAYNE, Ind., M. H. Hilt, Inc.
FT. WORTH, The Bracken Co.
GREENSBORO, N. C., Starr Davis Co., Inc.
GULFPORT, Miss., Paine Supply Co.
HOUSTON, Precision Insulation Co.
INDIANAPOLIS, Central Supply Co.
JACKSON, Miss., Paine Refrigeration & Supply Co.
JACKSONVILLE, Ferber Sheet Metal Works
JOPLIN, Mo., Joplin Cement Co.
KANSAS CITY, Central Insulation & Engineering Co.
LITTLE ROCK, Gunn Distributing Co.
LOS ANGELES, Western Fibrous Glass Products Co.
Thorpe Insulation Co.
LOUISVILLE, General Insulation & Roofing Co.
MEMPHIS, John A. Denie's Sons Co.
MIAMI, Crabtree Insulation Co.
Reynolds Aluminum Supply Co.
MILWAUKEE, F. R. Dengel Co.
MINNEAPOLIS, Asbestos Products, Inc.
NEWARK, N.J., Eastern Steam Specialty Co.
NEW HAVEN, Conn., Insulation Supply Co.
NEW ORLEANS, Eagle Asbestos & Packing
NEW YORK, Eastern Steam Specialty Co.
OKLAHOMA CITY, Ball Distributing & Engineering Co.
OMAHA, Cardinal Supply & Mfg. Co.
PHILADELPHIA, John F. Scanlan, Inc.
PHOENIX, Ariz., Kircher Asbestos & Rubber Co.
PITTSBURGH, Dravo Corp.
RALEIGH, N.C., Reynolds Aluminum Supply Co.
RAPID CITY, S. D., Robbins & Stearns Wholesale
RICHMOND, Va., Reynolds Aluminum Supply Co.
ROCKFORD, Ill., Mott Brothers Co.
SALT LAKE CITY, Bullough Asbestos Supply Co.
SAN ANTONIO, The Bracken Co.
SAN DIEGO, Western Fibrous Glass Products
SAN FRANCISCO, Western Fibrous Glass Products
SAVANNAH, Ga., Reynolds Aluminum Supply Co.
SEATTLE, Western Fibrous Glass Products
ST. LOUIS, The Stovey Company, Inc.
Hollander & Co.
ST. PAUL, Asbestos Products, Inc.
SULLIVAN, Ill., Lewie David, Inc.
SYRACUSE, N.Y., Burnett Process, Inc.
TALLAHASSEE, Fla., Bakers, Inc.
TAMPA, Fla., Eagle Roofing & Art Metal Works, Inc.
TULSA, Okla., Ball Distributing & Engr. Co.
TUPELO, Miss., Paine Supply Co.
VANCOUVER, B. C., Fleck Brothers Limited
WASHINGTON, D. C., Walter E. Campbell Co.
WICHITA, General Metals, Inc.

GUSTIN gb BACON

They compared "K" factors and cost factors . . . and bought SNAP*ON®

For big pipe applications, they found nothing that can actually *be* compared with Snap*On, the original one-piece pipe insulation molded of fine glass fibers. *Only* Snap*On is offered in one-piece sections, plain or jacketed, in diameters up to 36" — and these huge sections snap over pipe in less time than it takes to tell. Application couldn't be easier or more economical.

Consider, too, that Snap*On is permanent, yet reusable, and that its thermal efficiency rates with the highest of any general purpose pipe insulation on the market. Better yet, actually compare Snap*On the next time you insulate by asking your G-B Snap*On distributor to make a TEVA (Thermo-Economic Value Analysis) survey of your requirements.

FOR FREE TEVA SURVEY CALL YOUR LOCAL G-B SNAP*ON DISTRIBUTOR LISTED IN ADJOINING COLUMN

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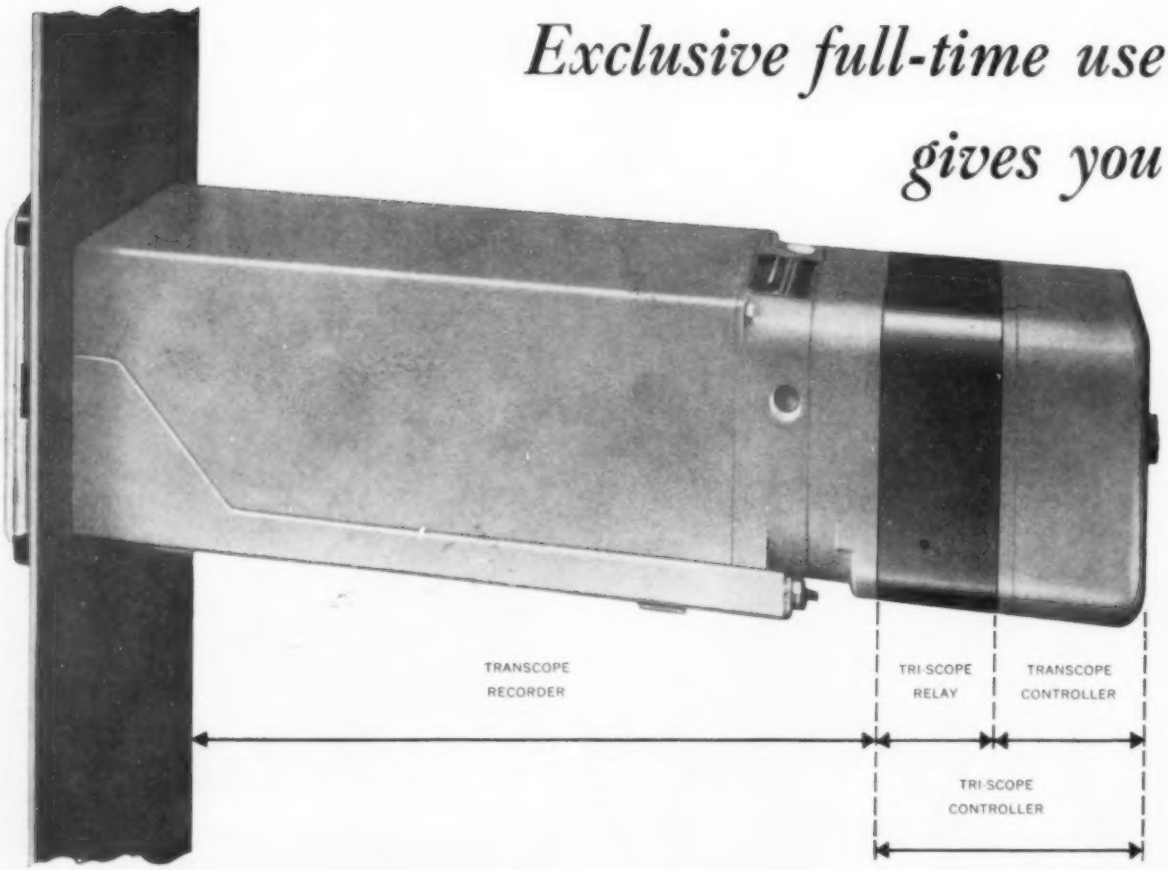
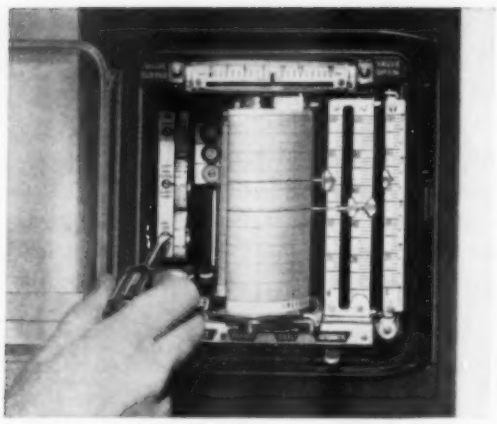
208 W. 10th St., Kansas City, Mo.

Thermal and acoustical glass fiber insulations • Pipe couplings and fittings
Molded glass fiber pipe insulation

NEW TAYLOR

Exclusive full-time use gives you





DESIGN FEATURES

- *Plug-in construction.*
- *Response adjustments made from front or back of panel.*
- *Mounts neatly between TRANSCOPE Recorder manifold and TRANSCOPE Controller.*
- *Can be added whenever process changes require it.*
- *Either field or panel mounting available.*
- *Uses standard TRANSCOPE parts.*

*Trade-Mark

90J SERIES
TRANSCOPE RECORDER

Taylor Instruments

TRI-SCOPE* CONTROLLER

of derivative-ahead-of-reset response†
these three important features

1 – Start up without overpeaking

2 – Recovery from large load changes without overpeaking

3 – Superior control following normal load changes

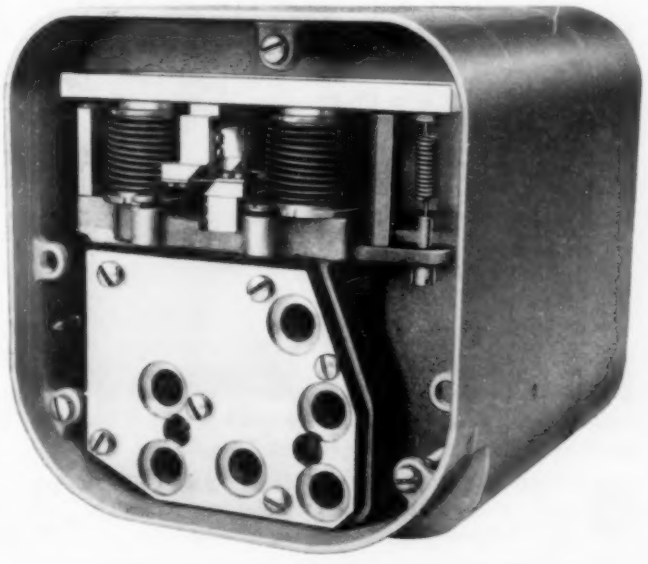
†Pioneered by Taylor in the TRI-ACT Controller*

HERE is the perfect solution to your problems of overpeaking on start-up and large load changes—inherent weaknesses of proportional-plus-reset controllers. It is equally effective *at all times* whether variable is approaching control point from above or below—on start-up, or following major process disturbances or changes in set point.

The TRI-SCOPE Controller consists of a proportional-plus-PRE-ACT*-response relay, called the TRI-SCOPE relay, and a proportional-plus-reset TRANSCOPE* Controller. This combination provides controller characteristics similar to that of the TRI-ACT Controller, making possible the three major benefits listed above.

This unique new controller has been time-proven on one of the toughest possible reactor applications. For full information see your Taylor Field Engineer, or write for Bulletin No. 98332. Taylor Instrument Companies, Rochester, N. Y., or Toronto, Ont.

For Vision . . . Ingenuity . . . Dependability in solving your process control problems.



NEW 414RF TRI-SCOPE CONTROLLER

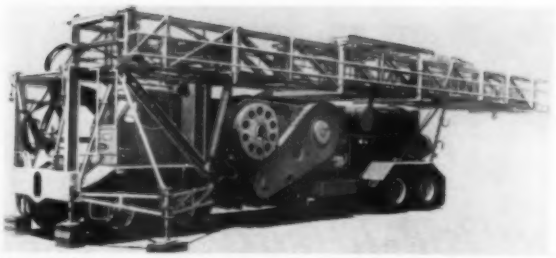
MEAN ACCURACY FIRST

SHOWCASE . . .

New Equipment

meters, strip-chart recorders, gas-lift meters, and field program timers.

The device is self-starting and inherently explosionproof. It's internally sealed to prevent corrosion or clogging. Parts exposed to gas are of aluminum or stainless steel. Gas consumption is 5 cu. ft. per hour at normal operating pressure of 5 psi. **Write or call: American Meter Co., 920 Payne Avenue, Erie, Pa., for details on Gasclok.**



Well-servicing rig saves time

. . . three ways over older types, the maker reports. The rig lessens trip time from the yard to the well location, reduces rigup time, and shortens trip time by making available more power through the hoist.

The Model KM 250 rig is a self-propelled, double or single-drum servicing hoist—or slim-hole rig—equipped with an oil-field type of engine with torque converter. It is mounted with a 96-ft., 170,000-lb.-capacity, structural mast. The mast is hydraulically raised and telescoped. Nominal depth rating with 2½-in. tubing is 15,000 ft.

The hoist frame employs plate type of construction. All chains are fully enclosed and flinger-lubricated. Double-end drum drive, along with the three-speed truck transmission, gives six speeds to the main drum. Three speeds are available to the sand drum. **Write or call: Cardwell Mfg. Co., Box 2001, Wichita, Kans., for details on KM 250 servicing rig.**

●

Pulse-code data gathering

. . . and reduction system permits most any type of logging program to be arranged using the maker's standard subassemblies to form the complete system. It thus eliminates the need for specially designed units for different types of installations.

The system will handle such variables as liquid level, temperature, pressure, and positive-displacement meter readings. The system can also be used to log the status of such operating equipment as valves and pump motors.

System capacity is limited only by the amount covered in the initial installation. The smallest-capacity unit will handle 48 points. For larger capa-

ROCKFORD

OIL FIELD TYPE

LONG LIFE
Heavy-Duty

POWER TAKE-OFF

Makes Out-Board Bearings Unnecessary

Eliminates the Pilot Bearing
Release and Main Bearings are lubricated for one year
Main Bearings are 40,000 hour type
Handles 5,000 pound Belt Loads
Out-Board Bearings and Flexible Couplings eliminated
Furnished with Single or Double Plate, Organic or Morlife® faced Gear tooth Type Clutches

Insure longer work life and reduce down-time with this NEW extra heavy-duty ROCKFORD POWER TAKE-OFF.

BW SEND FOR THIS HANDY BULLETIN
Gives dimensions, capacity tables and complete specifications. Suggests typical applications.

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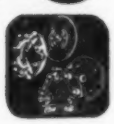
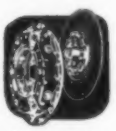
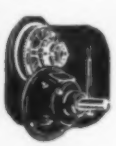
1305 Eighteenth Ave., Rockford, Ill., U.S.A.
Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.


Small Spring Loaded


Heavy Duty Spring Loaded

Oil or Dry Multiple Disc

Heavy Duty Over Center


Power Take-Offs

Speed Reducers

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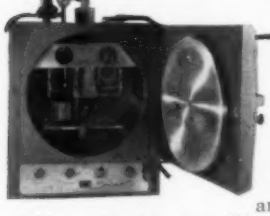
LOW COST
Gas Chromatography
CENCO®
VAPOR PHASE ANALYZER



Newest instrument completely versatile, proved for industrial control and research. Obtains chemical separations in minutes. Provides reproducible qualitative and quantitative analyses quickly and at low cost. Write for Bulletin 275.

No. 70130: complete with gas sampling valve but without recorder $995.00

CENCO the most complete line of scientific instruments and laboratory supplies in the world.

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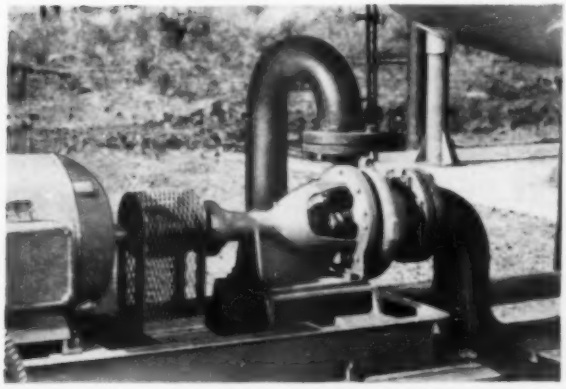


SALT WATER CAN'T DAMAGE THIS CENTRIFUGAL PUMP!

It's an AMPCO®

Doubly protected against severe erosion and corrosion: *(1) Wear rings* save the casing; *(2) Shaft sleeves* eliminate worn shafts. Repair and maintenance cost less.

Available *from stock* in stainless steel, Ampco Metal, and Illium "G" — and with elastomer or rubber linings. See your Ampco Pump Distributor. Or write today for descriptive Bulletin P-3b.

AMPCO METAL, INC. P-46
DEPT. 169K, MILWAUKEE 46, WIS.
WEST COAST PLANT: BURBANK, CALIFORNIA
SOUTHWEST PLANT: GARLAND (DALLAS COUNTY), TEXAS

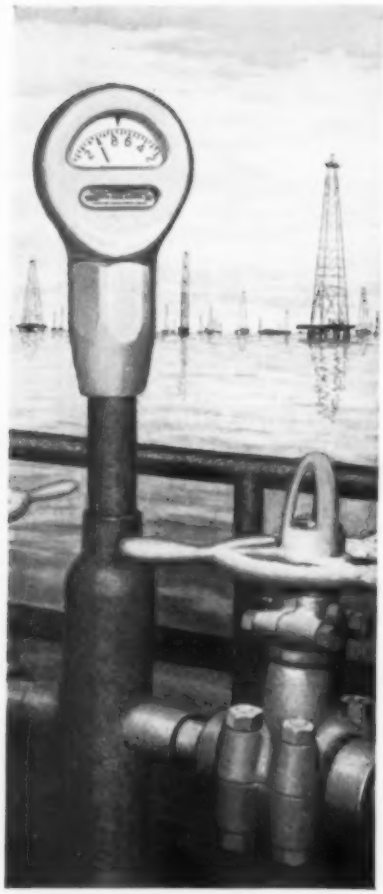
OOR
(Double O R)

RIDGID
number for drop-head pipe dies unequaled for easy work, good threads and extra long service!

Larger RIDGID Drop-Head Dies offer same easy work features. 111R, ⅛" to 1¼" 12R, ⅛" to 2"

No wonder pipe "pros" have bought hundreds of thousands of them, the easy way they snap into the ratchet ring handle . . . the smooth clean way they cut ⅛" to 1" threads . . . the quick way the dies reverse for close-to-wall threads. You'll like OOR's, too—get 'em at your Supply House.

The Ridge Tool Company, Elyria, Ohio, U.S.A.



Mud Pressure in Lake Maracaibo

If you are drilling for oil in Lake Maracaibo or for that matter, anywhere, you need Cameron Mud Line Pressure Gauges. Highly abrasive drilling mud under extreme pulsating pressure will wreck an ordinary gauge in short order. Cameron gauges were designed especially for this tough service. Visability is excellent, operation is accurate and smooth—fast pulsations from slush-pumps do not register. Wherever you drill or produce, COUNT ON CAMERON, the world's best pressure controls for drilling and production.

Cameron
IRON WORKS, Inc.
P. O. Box 1212-Houston, Texas.
Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., 76 Grosvenor St., London W. 1 England

cities, the number of points can be increased in multiples of 48. **Write or call: Vapor Recovery Systems Co., 2820 North Alameda, Compton, Calif., for Bulletin CP-3704.**

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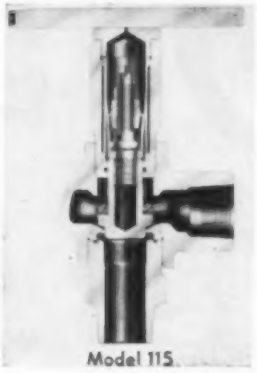
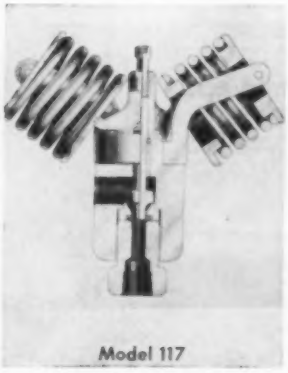


Model 115



Model 117

New relief valves

. . . assure tight shutoff, the maker claims. The Model 115 is a piston type for use where a manually reset valve is applicable. It comes complete with a bumper ring which is assembled on the piston. The ring protects the valve from the piston's high-pressure impact.

Adjustable restraining elements allow pressure settings within the valve's range. A reset punch is attached to the cylinder cap so functional testing can be performed. The restraining elements are not destroyed with each action.

New Model 117 is a snap-action, high-pressure relief valve. It serves a protective function on repressuring pumps, hydraulic-pumping units, and hydrostatic-test systems. A variety of pressure and capacity relationships are available with basic components common to several assemblies. Model 117 is available in ¼ to ¾-in. NPT. sizes. **Write or call: Kinzbach Tool Co., Inc., P. O. Box 277, Houston, for details on relief valve Models 115 and/or 117.**

ALLIS-CHALMERS

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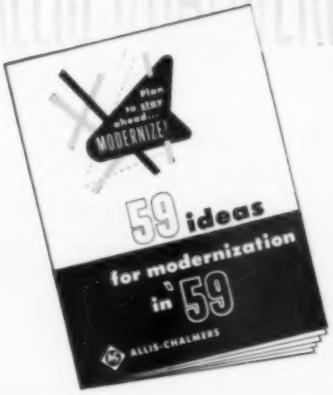


NEW brochure of ideas for modernizing

This booklet is based on the premise that modernization can start anywhere in your plant. It can be a single machine or operation . . . a better way of getting variable speed . . . a faster way to braze . . . or a newly available replacement. In fact, this type of updating is far more common than the sweeping change.

Get a copy of "59 ideas for modernization in '59" from your nearby A-C office or write Allis-Chalmers, Industries Group, Milwaukee 1, Wisconsin.

New motor development may eliminate premiums you've been paying for specially protected motors.

Electrical modernization includes placing substations close to machines being served.

ALLIS-CHALMERS

A-5850

open motors for extreme conditions

Save up to 60%!

Here's an amazing advance in motor technology! It's the *Super-Seal* motor line — an open motor design so completely unaffected by moisture, dust, dirt, oil, acids and alkalis that it can be used in many applications previously requiring more costly enclosed motors. *Savings range from 15 to 60%.*

Super-Seal motor superiority results from revolutionary insulating techniques. Available in any integral horsepower size, smaller *Super-Seal* motors incorporate an encapsulated stator. A durable epoxy resin encloses the stator, creating an electrical system impervious to outside elements.

In larger sizes, *Silco-Flex* insulation is used. In this system, silicone rubber is vulcanized into a homogeneous mass to form a flexible, moisture and heat resistant, void-free dielectric barrier around coils and leads.

Both of these insulation systems are unsurpassed. Proof? An encapsulated motor ran for hundreds of hours at full load in a 4% brine solution.

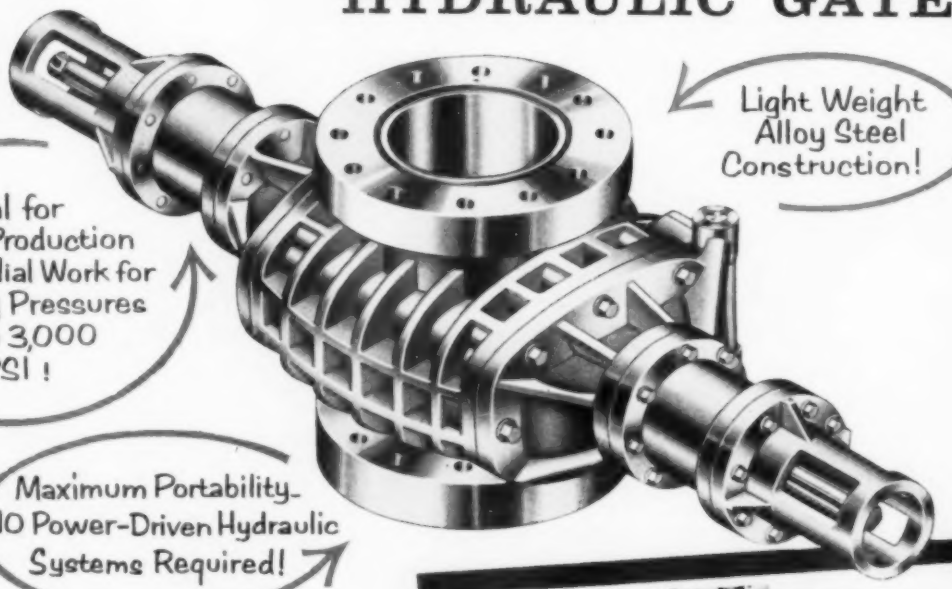
Find out more about new economies in motors from your A-C representative or distributor, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin. *Silco-Flex and Super-Seal are Allis-Chalmers trademarks.*

ALLIS-CHALMERS A-C ALLIS-CHALMERS

A-5802

. . . and ANOTHER Shaffer Advancement!

SHAFFER TYPE LWS HYDRAULIC GATES

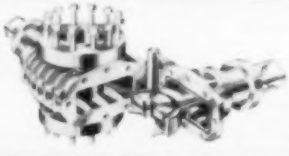


Light Weight Alloy Steel Construction!

Ideal for Drilling, Production and Remedial Work for Working Pressures Up to 3,000 PSI!

Maximum Portability— NO Power-Driven Hydraulic Systems Required!

Sectional View of Shaffer Type LWS Hydraulic Gate Note field-proven "In-Line" construction of each ram and its operating piston.



"Swinging End-Opening" design assures maximum ease in servicing the rams and the ram compartments.

Right on the heels of the recently announced new Shaffer Type XHP Hydraulic Gates for *Extra High Pressure* protection, comes another vitally important Shaffer pressure control advancement—Shaffer Type LWS Hydraulic Gates for new convenience and economy where pressure protection is desired on production, work-over and drilling operations in which portability and minimum rig-up time are important factors.

- **Type LWS Gates feature a new type of heavily-ribbed alloy steel construction that combines light weight with adequate strength for the rated working pressures.**
- **Being light in weight, Type LWS Gates are easy to install and to move about from rig to rig—therefore, are ideal for use on quick "in-and-out" jobs where rig-up and break-down time is vital.**
- **To further simplify portable operations, Type LWS Gates need not be operated by power-driven hydraulic systems. If preferred, a portable Shaffer Hydraulic Hand Pump—completely self-contained with its own fluid reservoir—is available for operating Type LWS Gates. It will close the rams in from 15 to 20 seconds—fast enough for even urgent pressure emergencies!**
- **Type LWS Gates feature "Swinging End-Opening" body construction for maximum ease in changing or servicing the rams without loss of operating fluid . . . have positive "In-Line" piston and ram design, with no yokes or complicated connections between each piston and its ram . . . and have many other important Shaffer advancements.**

Send for new 12 page brochure that gives full details on Shaffer Type LWS Hydraulic Gates. Or see your nearest Shaffer representative for complete information!

36 years OF OIL TOOL LEADERSHIP

SHAFFER

HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT • FISHING TOOLS THAT EXCEL

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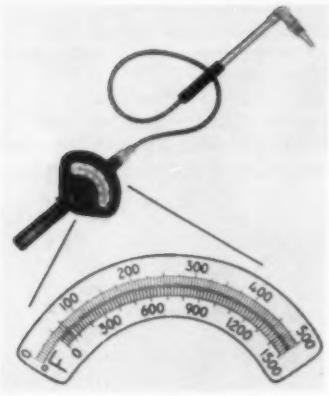
FARMINGTON, NEW MEXICO, Shaffer Tool Works, Post Office Box 1786
CASPER, WYOMING, Shaffer Tool Works, Post Office Box 827
HOUMA, LOUISIANA, Shaffer Tool Works, Post Office Box 1077
EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U.S.A.



Double-range surface pyrometer

. . . for plant or laboratory use accurately measures both surface and subsurface temperatures, the maker reports. Measuring 4¾ in. long, the indicator has two clear, distinct scale ranges in different colors. The low range goes from 5 to 500° F.; the high one from 0 to 1,500° F. The scales are subdivided into 5° increments. Readings are easily interpolated. The conveniently located selector switch permits fast scale change.

Room-temperature changes are automatically compensated for on both scales. Accuracy is 1½%. The Model DR-35 pyrometer is mounted in a dust, moisture, and shock-resistant, shielded, steel housing. Fifteen interchangeable thermocouples are available. **Write or call: Pyrometer Instrument Co., Inc., Bergenfield, N. Y., for Bulletin DR-35.**

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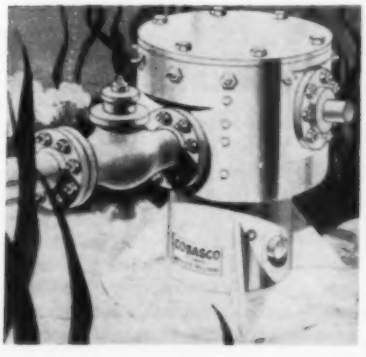
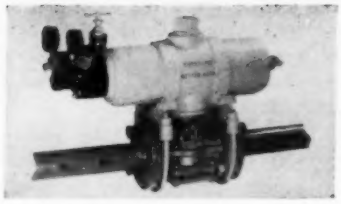


Stainless-steel wellhead developed

. . . for use in submerged offshore installations. The one-piece unitized wellhead is designed for installation on the ocean floor or for use in tidelands locations where "splash-area" protection is needed.

The Cosasco wellhead can be set directly on the floor of the ocean and drilling operations can then be performed from a floating platform such as a barge or converted landing craft.

According to the maker, the new wellhead permits drilling to be profitably carried on at far greater depths than before possible. Its body is hammer-forged from one billet of Type 303 stainless steel. It is available for all casing programs and all API series. The unitized wellhead can be designed to handle working pressures of 30,000 psi. or higher. **Write or call: Cosasco Div. of Perfect Circle Corp., 11655 McBean Drive, El Monte, Calif., for details on stainless-steel wellhead for offshore use.**



Actuator positions plug valves

. . . ball valves, butterfly valves, and other 90°-rotation devices. The Robotarm positioning actuator converts 3 to 15-psi. instrument-air pressure

PROVED BY MILES & MILES & MILES &

into a high torque for valve positioning. It develops up to 4,500 in.-lb. of torque from 100 psi. supply air, enough to operate most wrench-operated valves.

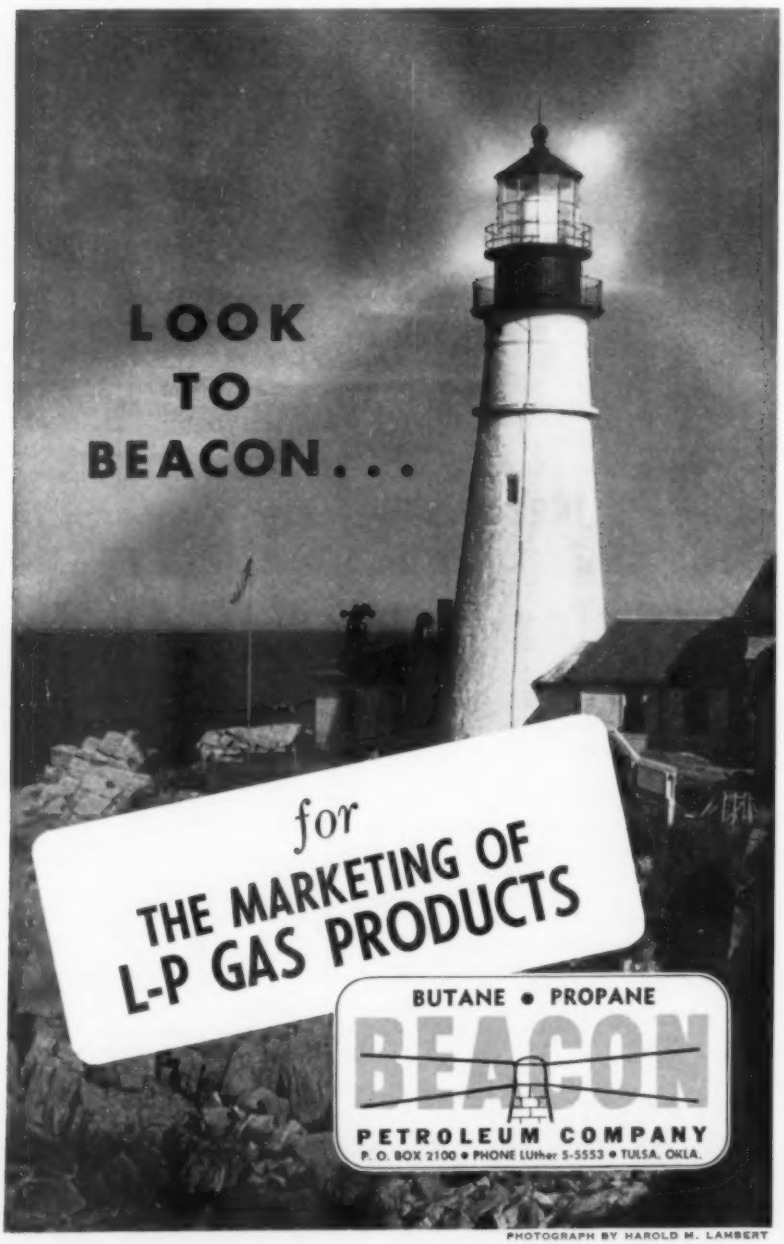
The actuator is a fully enclosed cylinder type of pneumatic operator. Its integral, rotating-drive mechanism is totally sealed in an oil bath.

A recessed socket on the rotating drive shaft allows the actuator to be easily adapted to most valve stems. The drive shaft is hollow to allow extending a valve-lubricator fitting. A square wrench boss atop the shaft allows manual valve operation. The actuator comes equipped with mounting brackets for field installation. **Write or call: Bettis Corp., 320 South Sixty-sixth Street, Houston 11, for details on Robotarm actuator.**

Mullite catalyst-support pellets

. . . are now available for use in petroleum refining. The pellets are thermally fused spheres of combined alumina and silica. The chemically inert pellets can be used in down-flow fixed-bed reactors to support the catalyst beds and so prevent excessive pressure drop across the bed from an accumulation of catalyst fines at the outlet of the reactor.

The pellets come as irregular spheres in sizes from ½ to ⅞ in. **Write or call: Davison Chemical Co., 101 North Charles Street, Baltimore 3, for details on mullite pellets for catalyst support.**

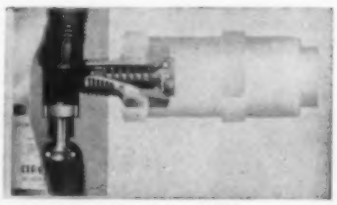


PHOTOGRAPH BY HAROLD M. LAMBERT

Flat file for large maps

. . . and drawings has a lock-equipped disappearing door to give unhampered access. It's expected to prove valuable for storing large "can't-fold" plans, tracings, maps, and blueprints measuring up to 33 by 42 in.

The file is made of steel and has four shelves. The Flatfile will stack in multiples to conserve floor space. The desk-high leg base places a single section at an easy working height. **Write or call: Ross-Martin Co., P. O. Box 800, Tulsa 1, for details on Flatfile.**



Gage protector gives safety

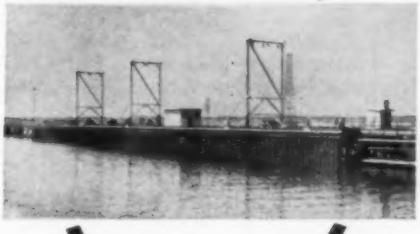
. . . for both personnel and gages. Providing instant, precise shutoff to protect gages from overpressure at pressures from 5 to 2,400 psi., the Series 1100 protector gives automatic gage cutout and cutin. Snubbing action in gas systems where surge or shock waves are encountered closes the valve unit momentarily to reduce shock on the gage elements.

Available for both gas and liquid systems, the protector permits cascading of gages to provide accurate pressure readings over a wide pressure range. The gage protector's valves automatically cut lower-pressure gages as system pressure rises and cut them in as it falls. **Write or call: Circle Seal Products Co., Inc., 2181 East Foothill Boulevard, Pasadena, Calif., for details on Series 1100 gage protector.**

PIONEERS IN MARINE CONSTRUCTION FOR THE OIL INDUSTRY

TERMINALS

We have long been leaders in the design and construction of wharfage facilities, both at home and abroad.



OFFSHORE

We designed and built the first steel, offshore platform to be placed in the Gulf of Mexico, and have continued in this field.

W. HORACE WILLIAMS COMPANY

ENGINEERS GENERAL CONTRACTORS

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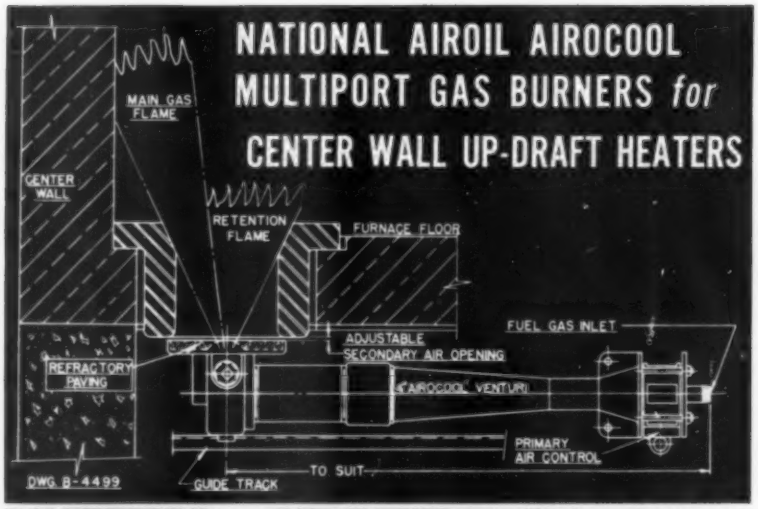
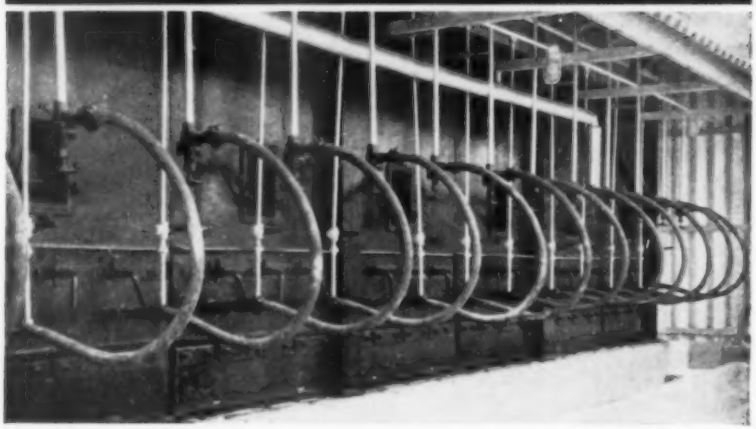
Marine Contractors Since 1908

A DIVISION OF WILLIAMS-McWILLIAMS INDUSTRIES, INC.

OFFSHORE STRUCTURES • WHARVES • BULKHEADS • FOUNDATIONS





. . . were especially designed and developed for angled firing vertically in all types of radiating wall furnaces-heaters . . . They are not an improvization.

AIROCOOL MULTIPORT INCLINED GAS BURNERS HAVE:

- **Nozzles that can be machined to direct the flame impact at 15°, or any other desired angle to produce the highest degree of heat transfer by radiation from the incandescent reflecting wall. They produce a short flame.**
- **An accurate secondary air adjustment to allow close limits of any excess air and thus result in the highest fuel efficiency.**
- **Higher B.T.U. capacity and greater turn down ratio, with only scant furnace draft and with a minimum of secondary air.**
- **Unique design features that enables them to burn high Hydrogen gas without "flash back".**
- **A reduced size and weight of refractory burner block of inexpensive design.**
- **Means for easily and quickly withdrawing or inserting the gas burner, and requiring only a minimum of labor to accomplish it.**
- **A low maintenance factor including that of the nozzle which is heat protected on its upper surface.**

National Airoil
BURNER COMPANY, INC.
Main Office & Factory: **1236 EAST SEDGLEY AVE., PHILADELPHIA 34, PA.**
SOUTHWESTERN DIVISION: 2512 SOUTH BOULEVARD, HOUSTON 6, TEXAS

SHOWCASE . . .

New Literature

PVC pipe selection, application

. . . manual is now yours for the asking. The 16-page reference publication gives detailed information for selecting and applying polyvinyl chloride pipe, tubing, and fittings. The manual is packed with photos, charts, and tables. It covers both normal and high-impact PVC. Cost of PVC and comparable metal piping are included, along with tubing sizes and specifications. **Write or call: Carlon Products Corp., 10225 Meech Avenue, Cleveland 5, for Bulletin PVC-100.**

Groove-joint plier

. . . which can be used in many places to a greater advantage than the ordinary pipe wrench is described in new Catalog HL112. The 12-in. plier is ideal for tightening the connectors on large electrical conduit boxes, the maker reports. It is also available with smooth jaws which make it adaptable for use on chrome-plated plumbing fixtures. Several numbers of pliers which have been added to the line are shown in the company's 50th Anniversary Catalog W-22, also available. **Write or call: Diamond Tool & Horseshoe Co., Duluth 7, Minn., for Catalog W-22 and/or HL112.**

Thermocouple Bulletin 3.8A

. . . covering Aeropak thermocouples with a temperature range of —400° to 2,000° F. made with diameters of 0.025 to 0.313 in. is now available. The thermocouples can be bent to shape, and weldments can be performed directly on them. Also, they are pressuretight to 50,000 psi.

The catalog is well illustrated with data, charts, and pictures. It specifies the choice of thermocouple diameters, materials, typical connectors, junctions, and terminations. And it graphically illustrates a special ceramic-insulated thermocouple. **Write or call: Aero Research Instrument Co., 315 North Aberdeen Street, Chicago 7, for Bulletin 3.8A.**

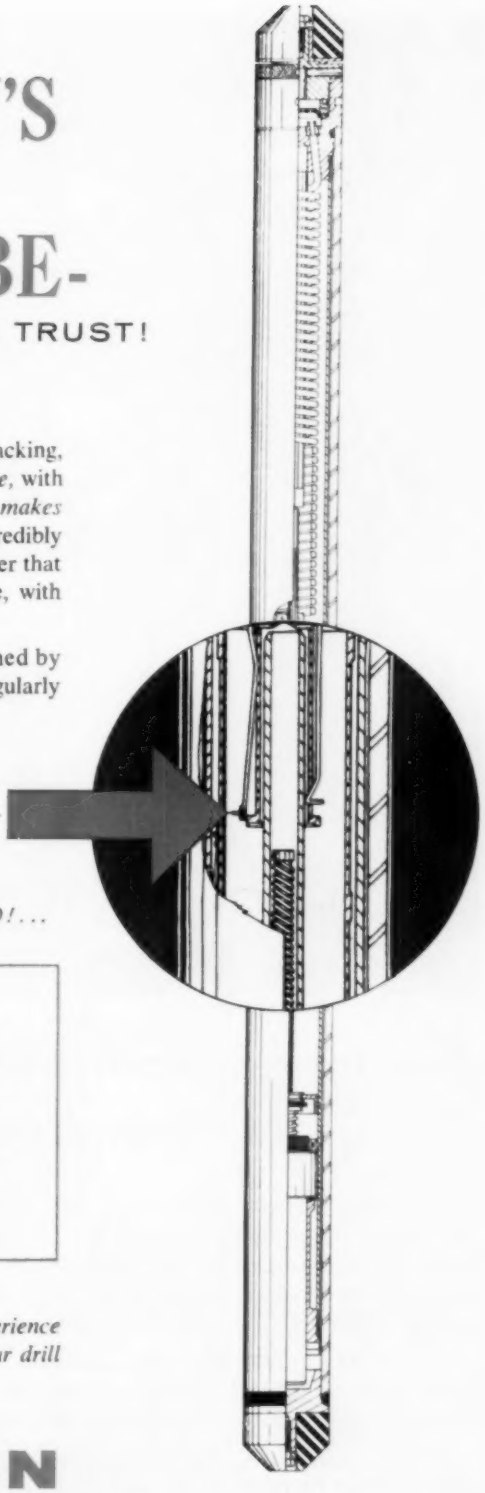
Lightning Facts and Figures

. . . is the title of a new, 20-page pamphlet that explains how lightning occurs, how often it is likely to strike in an area, and how individuals, as well as various structures, can be protected against lightning loss or damage. The booklet includes safety rules, statistics on loss of life and property, and technical data on lightning charges. **Write or call:**

HALLIBURTON'S
friction-free
BOURDON TUBE-
FOR TESTING RESULTS YOU CAN TRUST!

Unlike some recording gauges that incorporate packing, the Halliburton Bourdon Tube is virtually *friction-free*, with only one point of pressure contact . . . *where the stylus makes its mark upon the chart*. There, the pressure is incredibly low, averaging but 6/100th of an ounce! It's no wonder that the Halliburton Bourdon Tube is extremely accurate, with a tolerance of only one-half of one per cent!

This unmatched accuracy is constantly maintained by Halliburton Testing Services; each Bourdon Tube is regularly calibrated bi-monthly.



. . . WHO READS THE CHART? . . . THAT'S IMPORTANT TOO! . . .

No matter how accurate, chart data is valueless unless properly interpreted. Halliburton Chart Readers are skilled specialists, thoroughly trained in the use of the Halliburton Microreader . . . for double assurance of precision accuracy and experienced interpretation.

Get the benefits of Halliburton accuracy and experience in your reservoir evaluation. Call Halliburton for your drill stem test!

HALLIBURTON
OIL WELL CEMENTING COMPANY, DUNCAN, OKLAHOMA
TESTING SERVICES

HALLIBURTON RESERVOIR EVALUATION:
A NEW WAY TO SAY DRILL STEM TESTING

Get longer tool-joint life— use Humble's **THREDKOTE 701**

THREDKOTE 701 is a top-quality thread lubricant containing 60% pure metallic zinc. When the joint is made up tight, the zinc in THREDKOTE 701 is deposited on the threads in a thin film. As the string is run, this zinc film effectively guards against metal-to-metal contact and prevents galling. The result: *longer tool-joint life.*

THREDKOTE 701 gives tool-joint threads superior lubrication. Joints make up tight and break out easy. And THREDKOTE 701 maintains its quality and consistency under the most rugged running conditions.

It is essential to give new tool-joint threads a careful and complete coat of THREDKOTE 701 for their first four or five trips. New tool joints resist make-up more than used tool joints; need extra lubrication and protection. The continued use of THREDKOTE 701 on each trip will keep your string running tight and true.

● *THREDKOTE 701 is one of a complete line of Humble thread compounds. There's one for almost every type of threaded connection. For more information on THREDKOTE, call your nearest Humble wholesale plant, or phone or write:*

Humble Oil & Refining Company
Sales Technical Service
P. O. Box 2180
Houston 1, Texas

HUMBLE

HUMBLE OIL & REFINING COMPANY

Lightning Protection, Institute, 53 West Jackson Boulevard, Chicago 4, for Lightning Facts and Figures Pamphlet.

Spark-plug pressure indicator

. . . for cylinder-pressure measurements is described in new Bulletin PPI-106. The indicator is designed for continuous, accurate measurements of engine compression and firing pressures without modification of the combustion chamber or special spark plugs. Applications include engineering evaluation, production test, field maintenance, and fuel octane rating on both slow and high-speed internal combustion engines. The design approach uses a separate subminiature quartz gage mounted in a standard spark plug. Pressure changes generating an electrical charge in the pickup are displayed on an oscilloscope screen. **Write or call: Kistler Instrument Corp., 15 Webster Street, North Tanawanda, N. Y., for Bulletin PPI-106.**

Insulation adhesives

. . . weatherproofing, coatings, vapor barriers, and sealing compounds are discussed in new Bulletin I-C 58. The catalog gives facts on their uses, properties, temperature ranges, and coverage. Products described include white, colored, and adhesive-coatings, asphalt and aluminum-asphalt weatherproofing, high-temperature adhesives, nonshrinking vapor sealers, high-pressure joint sealers, and fire-retardant vapor barriers. **Write or call: Insul-Coustic Corp., 42-23 54th Road, Maspeth 78, N. Y., for Bulletin 1-C 58.**

New flow-switch folder

. . . offers approaches to many problems involving automatic controls or safety devices. Bulletin FS-1 covers switches which respond to flow of liquid in a pipeline and make or break an electrical circuit. They mount on the pipeline, and a paddle extends down into the flow. When flow in the pipe starts or stops, movement of the paddle operates the switch. As shown in the bulletin, the flow switches can be used to sound alarms, and start or stop motors, burners, or metering devices. Flow switches for pressures up to 150 psi. are covered in the folder. **Write or call: McDonnell & Miller, Inc., 3500 North Spaulding Avenue, Chicago 18, for Bulletin FS-1.**

Process instruments

. . . and equipment for automation are described in new eight-page two-color Bulletin 100-R5. It contains photos, operational data, and design features of 12 products for control of materials in motion. These include flow tubes, venturi tubes, and valve positioners. **Write or call: B-I-F Industries, Inc., 345 Harris Avenue, Providence, R. I., for Bulletin 100-R5.**

Obtaining clean, dry air

. . . for refineries and other plants by hydrocarbon-vapor adsorption is detailed in new, 10-page Bulletin SC-1047. The device is called a Vape-Sorber. It comes in 14 sizes. The bulletin explains in detail how the hydrocarbon vapor-adsorption device protects air and gas systems and pneumatically operated instruments and mechanisms from the effects of oil vapor, free oil, water-oil emulsions, and dirt. **Write or call: Selas Corp. of America, Dresher, Penn., for Bulletin SC-1047.**

Open type of motors

. . . suitable for many uses which normally require an enclosed design are described in a new six-page folder. The motors are available in all integral horsepower frames. They are not affected by moisture, dust, dirt, oils, acids, or alkalies. Called Super-Seal, the motors have a 1.15 service factor which often permits using a smaller-than-usual motor size. An example of how the motor saved 30% on a typical pump drive is given in the bulletin. **Write or call: Allis-Chalmers Mfg. Co., 1126 South Seventieth Street, Milwaukee 1, for Bulletin 05-51B9040.**

Centrifugal pumps

. . . that are single-stage, double-suction with horizontally split cases are shown in a new 16-page catalog. The pumps are available in 33 sizes with oil-lubricated bearings. Capacities range from 200 to 6,400 g.p.m. and heads range up to 425 ft. The bulletin includes a description of the pumps, sectional views, charts, construction details, performance curves, and dimensions and mechanical data. **Write or call: Goulds Pumps, Inc., 47 Black Brook Road, Seneca Falls, N. Y., for Bulletin 721.6.**

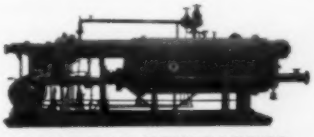
Forged-steel unions

. . . and fittings are discussed in a new, simplified catalog now available. It gives specifications on unions, check-valves, and forged-steel fittings, rated at 2,000 through 6,000 lb. c.w.p., are included. The catalog is a 16-page, loose-leaf folder. **Write or call: Clayton Mark & Co., 1900 Dempster Street, Evanston, Ill., for Forged-Steel Unions Catalog.**

SPECIAL EQUIPMENT for the PROCESS INDUSTRY

AIR HEATERS

Outlet temperatures from 200° to 3000°. Available as a complete unit, or burner unit only. Any required pressure can be met with oil or gas or both as fuels.



INERT GAS GENERATORS

Operating reports on units now in service show perfect CO_2, no excess air, no unburned combustibles, wide turndown, and completely dependable flame stability. Specially engineered to your specifications.

The John Zink line of process equipment also includes the famous JZ Smokeless Field Flare, Waste Disposal Units, and more than 50 gas, oil and combination gas and oil burners. Special burners and process equipment designed for your individual application.

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COMPANY
4401 S. PEORIA
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. . . BECAUSE they must do the job well

Based on established standards, Larkin Centralizers take 45% less permanent set than maximum . . . exert 300% more initial centering force than minimum required.

Based on field performance, Larkin Centralizers provide convenience of installation, ease of starting, maximum centering force and minimum permanent set. There's a size and range for every condition. Specify Larkin Centralizers . . . through your supply store.

LARKIN CASING CENTRALIZERS ARE DESIGNED AND PROOF-TESTED TO EXCEED ANY KNOWN STANDARD FOR CENTRALIZER PERFORMANCE

LARKIN PACKER COMPANY, INC.
WAXAHACHIE, TEXAS

LARKIN
...Through Your Supply Store

LARKIN LEADERSHIP HAS BEEN EARNED BY YEARS OF DEPENDABLE PERFORMANCE

EQUIPMENT MEN

Phillip G. Jackson joins

. . . Rector Well Equipment Co., Inc., as sales engineer in the Rocky Mountain area, according to J. L. Pinkard, sales manager. Jackson will headquarter in Casper, Wyo. He formerly served with Republic Supply Co. and Western Oil Tool Co., Inc.

BS&B, Inc., announces

F. C. Myers

. . . that headquarters for sales management of its oil-field equipment division have been established at Houston and that F. C. Myers, vice president and manager of oil-field sales and service, has been transferred there. In addition to serving as division sales manager, he has direct supervision of district sales managers headquartered at Houston, Harvey, La., and Alice, Tex., according to Henry A. Ruysser, Jr., executive vice president of Black, Sivalls & Bryson.

C. J. Spivey joins

C. J. Spivey

. . . Petty Geophysical Co., San Antonio, Tex., in its foreign exploration department, according to Dave Tver, executive vice president. Spivey was formerly manager of Venezuelan operations for Geophysical Service, Inc., Dallas, Tex.

William L. Solt appointed

. . . director of advertising for Goodrich-Gulf Chemicals, Inc., according to J. E. Miller, vice president, sales. Solt began his advertising career with Mohawk Rubber Co. and before this appointment was with B. F. Goodrich Tire Co.

Du Pont announces changes

R. M. Glover, assistant sales manager of E. I. Du Pont de Nemours & Co., Inc.'s petroleum chemicals division, was named manager of the newly-created sales program section of the division, while W. E. Bettoney has been designated additives sales manager. R. O. Braendle replaces Bettoney as technical manager in the eastern region office in New York; and C. B. Miller succeeds Braendle as technical manager in the Mid-Continent region office at Tulsa.

J. J. Mikita, who has been both additives sales manager and technical manager for the division, will devote full time to management of the technical section. The new section will be responsible for sales promotion programs, advertising, and petroleum marketing activities, according to W. A. Taft, director of sales.

Tex-Tube, Inc., appoints

. . . William H. Cottle as head of sales for Tex-Tube manufactured products for industrial and mechanical applications. His former position was sales manager for Vinson Steel & Aluminum Co.

C. J. Wilson joins

. . . B-I-F Industries, Inc., as an eastern regional engineer. He will share in the development and utilization of the company's line of petroleum metering and controlling equipment in use on pipelines and refineries. He has previously been with Union Oil Co., Griscom-Russell Co., and C. F. Braun Co.

Clark. Bros. Co. names

. . . Charles Clark, left, third generation descendant of the original founders, as sales engineer for the Pittsburgh office. At right is his father, C. Paul Clark, former president of the company from 1936 to 1953. Charles Clark formerly served 6 years with Bradbury Kenrick Associates, manufacturer's agents for Clark Bros. in Detroit.

F. S. Alexander appointed

. . . sales manager of the dehydrator division of Rolo Manufacturing Co. Rolo recently was licensed exclusively by Fish Engineering Corp. to manufacture and sell the Fish calcium chloride gas dehydrator, and Alexander will be in charge of sales of this unit. He formerly was with Standard Oil Co. of Tex., Pacific Northwest Pipeline Corp., and Fish Engineering.

Tulsa firm appointed

. . . a stocking distributor for Pacific Mercury electric plants. Alan Edwards Manufacturing Co., Inc., will stock representative models of Pacific Mercury electric plants designed specifically for use by firefighters and the oil industry. It will also maintain a complete parts and service department, according to manager A. J. Edwards, Jr.

Johns-Manville Corp. proposes

. . . a merger with L.O.F. Glass Fibers Co. on the basis of one share of its common stock for 2½ shares of the glass company's common stock, according to A. R. Fisher, chairman and president of Johns-Manville; G. P. MacNichol, Jr., chairman; and R. H. Barnard, president of L.O.F. Operation of L.O.F. will continue as it is with Barnard as president.

Joe McGraw, Jr., joins

Joe McGraw, Jr.

. . . Security Engineering Division as a regional sales representative, according to Claude L. Griffin, sales manager for the United States and Canada. McGraw will headquarter in the recently-opened office in Tulsa. He was formerly with American Iron & Machine Works Co. in Tulsa.

Oil Well Supply Div. reports

. . . the appointment of W. A. Pratz as manager of the Victoria, Tex., store; and the transfer of D. L. Cook, field representative at Pettus, Tex., to McAllen, Tex., according to M. F. Jones, Gulf Coast area manager. Also reported is the transfer of C. E. Lewis,

This interior view of a Columbian Rigid Frame Steel Building used as a warehouse clearly shows how the unobstructed floor space and overhead clearance permits full use of space, provides easy traffic flow. High loaders operate easily. Likewise overhead lighting is shadow-free and there is no interference with forced air heating.

Get Greatest Usable Space at Lowest Cost
RIGID FRAME STEEL BUILDINGS

MASTER-CRAFTED BY COLUMBIAN SINCE 1891

Columbian RIGID FRAME Steel Buildings not only make best use of available space, but give you the strength and permanence of steel for low initial cost and low maintenance. Erected in mere *days*, not weeks or months, Columbian Steel Buildings don't warp, rot, crack or crumble, are firesafe, and perfectly grounded against lightning—hence, command lowest insurance rates. They're easily ventilated or insulated. They're quickly and efficiently moved or expanded. No other single means of construction offers so many advantages.

WRITE COLUMBIAN TODAY!
Get new FREE folders giving construction details of Columbian RIGID FRAME Steel Buildings. We'll gladly help you figure your needs at *no cost or obligation to you.*

Columbian distributor, Mapp Tank Co., at Odessa, Texas, uses a Columbian building for their comfortable modern office.

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McGuffin Tank Co.
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NEBRASKA
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NEW MEXICO
Allied Supply Co.
ARTESIA
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Miller Tank Co.
ABILENE
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Mapp Tank Co.
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Westex Tank Co.
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Columbian Bolted Steel Storage Tanks go up fast, stay *tight*. Your Columbian distributor can supply them *quickly!* Welded or bolted storage tanks, pressure vessels and special purpose tanks available with linings applied after fabrication—rubber linings or specially engineered linings to store your hard-to-handle liquids.

WRITE US NOW for Columbian's free Bolted Steel Tanks booklet. Let us help you solve your liquid storage problems quickly, efficiently.

COLUMBIAN STEEL TANK COMPANY
P. O. Box 4048-J Kansas City, Mo.

STEEL, Master-Crafted by Columbian...First for Lasting Strength

manager of the store at San Angelo, Tex., to Sweetwater, Tex., according to William Miskimins, Central Midwest area manager. Pratz joined Oilwell in 1952; Cook in 1953; and Lewis in 1953.

Griscom-Russell Co. sets mark

. . . in the Great Lakes-overseas shipment of the 1,000-ton air-cooled heat exchangers from its Massillon, Ohio, plant to the Rotterdam refinery of Esso Nederland N. V. The shipment is expected to set a new mark for industrial equipment traveling the Great Lakes route to Europe. These huge heat exchangers are believed to make the largest installation of its kind in the world.

Initial shipment, totaling more than 100 tons left the Port of Cleveland late in September. Subsequent shipments are scheduled for departure through December. Sections of the Fin Fan exchangers, to be assembled at the Rotterdam site, will provide cooling services for the refinery's atmospheric pipe still, gas-oil Hydrofiner, Powerformer, and Powerformer feed splitter.

A duplicate of the big exchanger is under construction in Wales for use at Esso's Milford Haven Refinery. It is being built by Spiro-Gills, Ltd., Griscom-Russell's British associate.

Kenneth Tardif promoted

. . . to home sales manager. He will also hold the post of advertising manager for G. A. Harvey & Co., Ltd. (London).

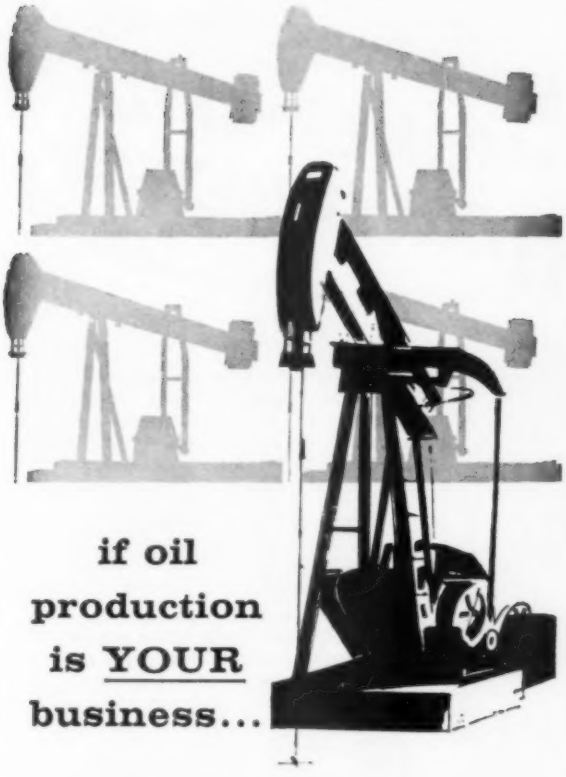
Rector Well announces changes

Charles Zartman

. . . in personnel, according to L. L. Rector, president, Rector Well Equipment Co., Inc. Charles Zartman, who has been both chief engineer and assistant to the president, will devote full time to the position of assistant to the president. Replacing Zartman as chief engineer is George Garrett, formerly development engineer. John L. Curry was named to the newly created po-

George Garrett

J. L. Curry



if oil production is YOUR business...

helping you is OUR business

Here, at Republic National Bank, the combined experience and proved performance of the South's largest and most active Oil Department are concentrated on better service to the oil producer. However complex your production financing problem, you'll get expert attention to your requirements at Republic. How may we help you?

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CAPITAL FUNDS OVER $90,000,000 LARGEST IN THE SOUTH

REPUBLIC National BANK of Dallas

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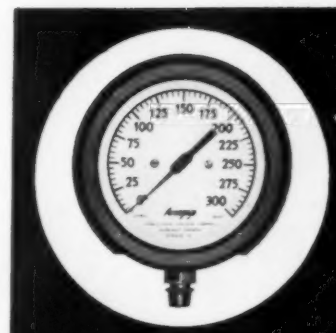
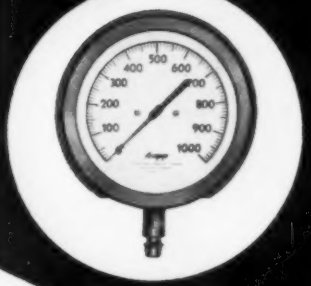


...many models many applications

ACRAGAGE



one standard of quality... the finest!

The various industrial companies and government services using Acragages represent a cross section of modern technology, covering a wide range of products, services and research projects. While the applications may differ widely, a basic similarity lies in some of the major reasons why Acragages are preferred: high accuracy, precision manufacture, fast and easy calibration, built-in safety, and assured dependability.

Acragages are the most advanced of the bourdon tube type pressure gage. Besides high accuracy, they feature solid front cases providing complete safety as well as quick and easy access to the bourdon tube assembly and internal mechanism for easy calibration. This solid front case feature is standard with Acragage . . . only one of a number of advancements typifying Acragage's development policy.

ACRAGAGE GIVES YOU MORE GAGE PER DOLLAR

- VACUUM GAGES
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- MILITARY OXYGEN FLOW INDICATORS
- MILITARY OXYGEN GAGES

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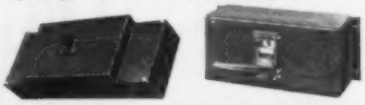
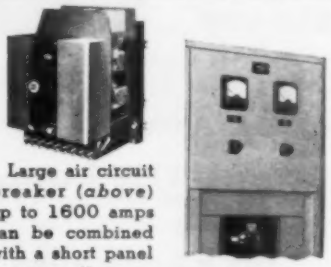
SQUARE D's NEW Unit Substation

IN POWER-STYLE CONSTRUCTION

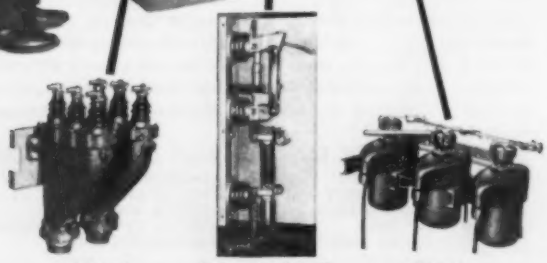
Designed to match Square D's Power-Style switchboards and control centers, these new Unit Substations meet NEMA, ASA, and AIEE standards. Available from 75 to 500 KVA; in primary voltages up to 4800V; secondary up to 600V.



Molded case circuit breakers (*left*) up to 800 amperes and QMB Saflex fusible switches (*right*) up to 600 amperes are available in compact panel construction.



Large air circuit breaker (*above*) up to 1600 amps can be combined with a short panel in one section.



Pothead | Interrupter Switch | Cutout

Potheads, fused or unfused load break air-interrupter switches and fused or unfused oil-filled cutouts are available. Air-interrupter switches and cutouts are easily accessible from front of Substation.

REAR VIEW

3 single phase, dry-type transformers individually mounted on base in ventilated enclosure—heating and vibration held to a minimum. Transformers easily accessible for maintenance and inspection. When no air circuit breaker or metering equipment is used, entire area at top left is available for pull box.

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

sition of sales coordinator. He was formerly sales manager of the cementing equipment division. Zartman has been with Rector Well for 27 years. Garrett joined the company 7 months ago, and Curry has been with the company for 7 years.

Oil Center Tool Co. names

. . . two new vice presidents and two regional sales managers, according to Al Wolff, president. C. Ross Spencer

C. R. Spencer

C. T. Jones

was named vice president and manager, foreign marketing; and Charles T. Jones is the new vice president and sales manager. Spencer formerly was sales manager, while Jones was assistant sales manager. New regional sales managers are M. E. Hunter, for

M. E. Hunter

A. C. West, Jr.

the eastern region; and A. C. West, Jr., for the western region. All will headquarter in Houston. Spencer joined O-C-T in 1953 following 14 years with National Supply Co. Jones has been with O-C-T since 1947. Hunter is an O-C-T veteran of 21 years; and West joined the company in 1950.

Charles F. Hill appointed

C. F. Hill

. . . as general manager of the industrial division of Massey - Ferguson, Inc. He succeeds Charles J. Davis. The announcement came from A. A. Thornbrough, president. Under Hill the industrial division will continue as a separate division of Massey-Ferguson with complete responsibility for separate branch and head office sales operations, advertising, promotion, and service.

Officers-directors reelected

. . . at the annual stockholders meeting of Aero Design & Engineering Co., a subsidiary of Rockwell-Standard Corp. Tom Harris, director of marketing and chief sales executive for the firm, was elected a vice president. He will continue in charge of all marketing and sales activities and will be a member of the management committee.

Tom Harris

Directors include: Col. W. F. Rockwell, chairman; W. M. Balliette; C. J. Queenan; A. A. Finnell; and G. C. Shannon, all of Rockwell-Standard. G. T. Pew, president; Budd Parks, first vice president; Ted Smith, vice president; and E. K. Gaylord of Oklahoma City, in addition to A. R. Bell, Glenmede Trust Co., Philadelphia.

C. E. Millard Jr., appointed

. . . store manager at Clarksburg, W. Va., for Jones & Laughlin Supply Division, according to A. G. Bastian.

Get to the HEART of your BUILDING PROBLEMS

Need Special INSULATION?

Shown here is another Braden special designed Building insulated against extreme temperature fluctuations of the far North.

You can secure ALL the advantages of insulation when you purchase a Braden Insulated Building.

Prefabricated, complete in our plant, insulated sidewall sections are shipped with windows and door frames installed. Various types of roof insulation are available.

Regardless of exterior covering Braden Buildings can be insulated against heat and/or cold comparable to *any other type construction.*

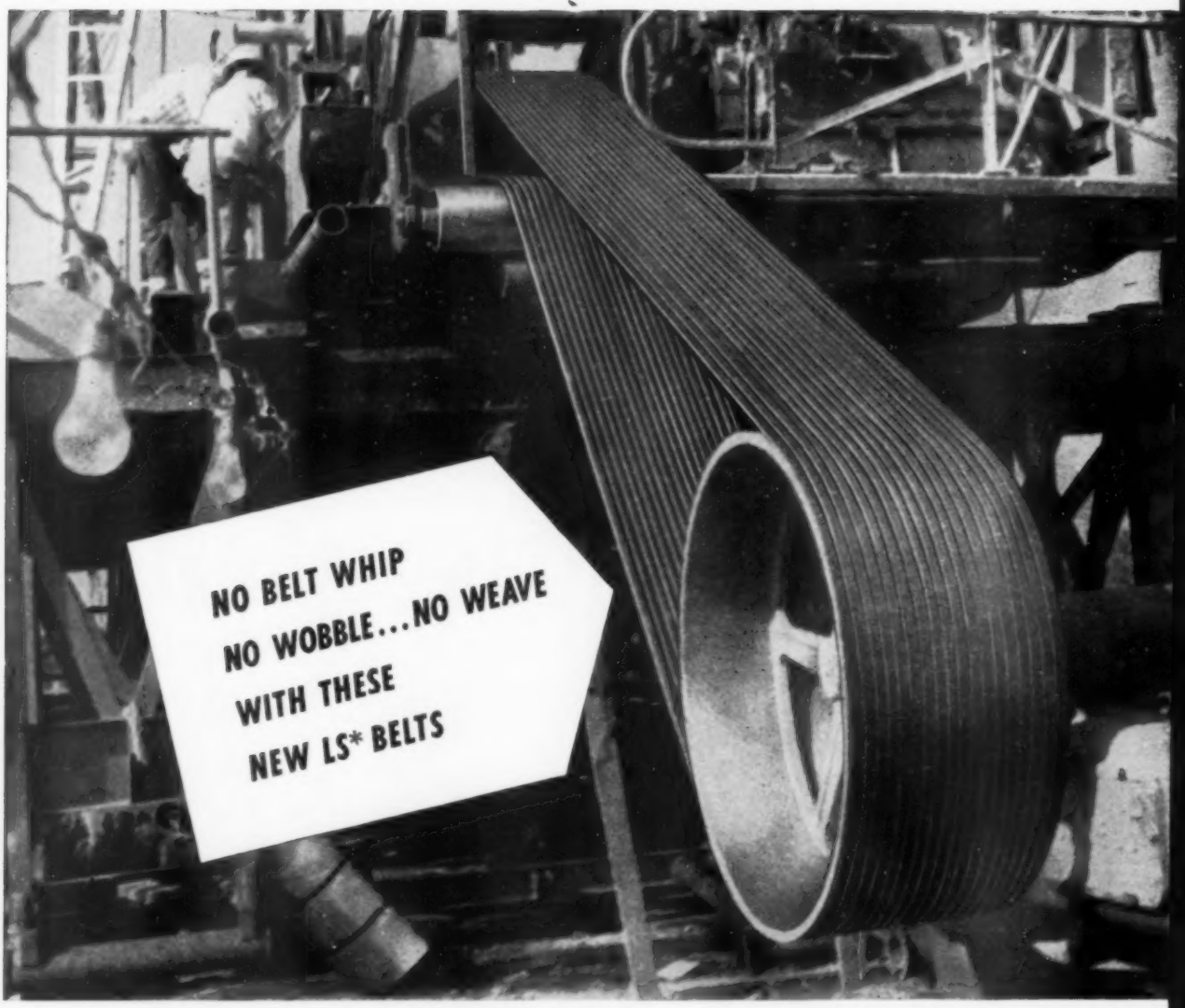
Write for Braden Catalog.

BRADEN SECTIONAL STEEL BUILDINGS

BRADEN STEEL CORP.

1007 EAST ADMIRAL TULSA 1, OKLAHOMA

ENGINEERS • FABRICATORS • ERECTORS



New CONDOR LS* V-BELTS Come Matched to Stay

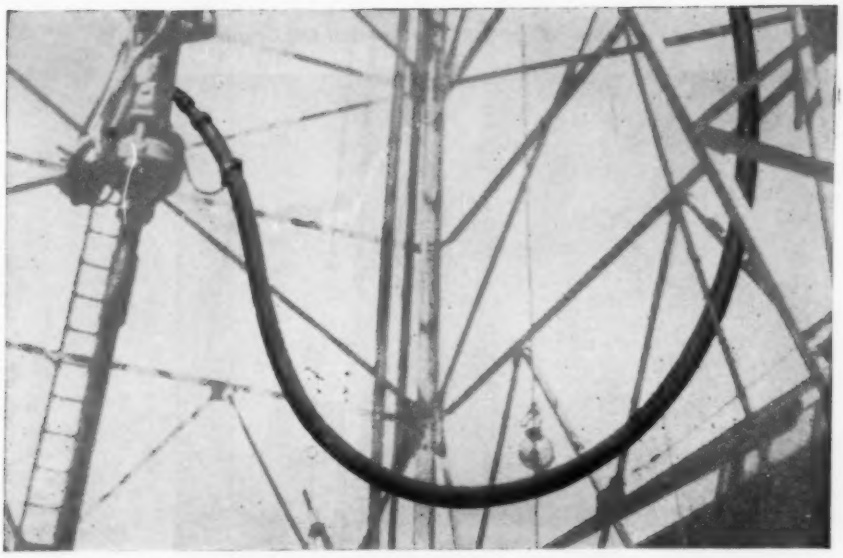
Give "More Use for your ~~per~~ Dollar"

Top to bottom, *every* part of a Condor LS Belt is "length stabilized" . . . *engineered* to minimize belt stretch and eliminate whip and turnover that leads to belt failure. No whip, no wobble, no weave—a set of matched Condor LS Belts *stays* matched to outperform and outlast any other V-Belt under the heaviest loads. Condor LS Belts set new standards of performance. Write for Bulletin #M210.

- **New "Stabilizing" Section**
- **Repositioned Belt Strength Members**
- **Length Stability *Without* Stretch**
- **Smoother, Cooler Running**
- **Moisture-Proof Vacuum Packaging**

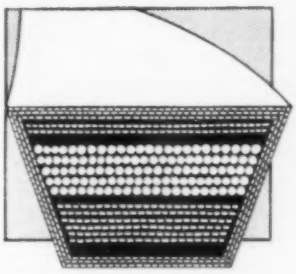
Each Section C and D long center Condor LS Belt is measured under controlled humidity . . . length certified and tagged . . . and vacuum sealed in aluminum-lined, moisture-proof bags. Result? Factory-fresh belts. Positive matching . . . no shrinkage or elongation in storage . . . sustained uniformity on your drive!

*Length Stabilized

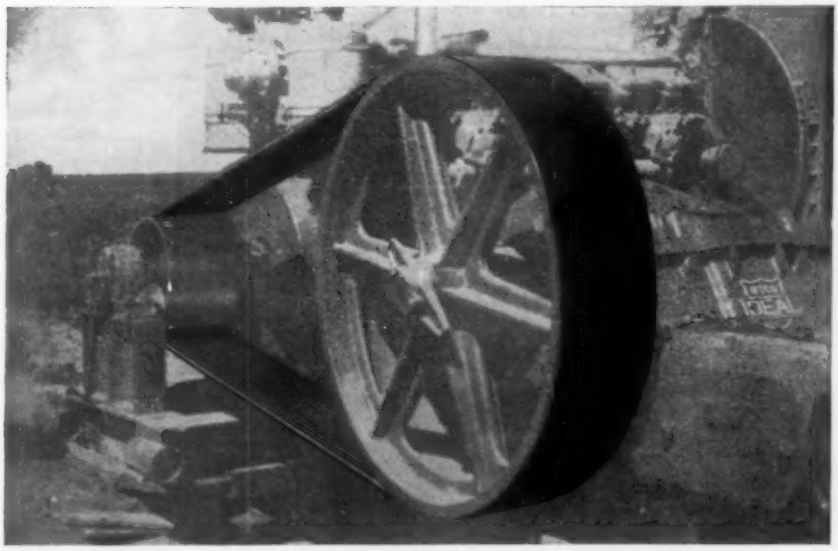


RAY-MAN ROTARY HOSE—Unequalled strength *plus* flexibility . . . unusual resistance to kinking or accidental crushing. Ray-Man CBL Rotary Hose holds steady in the rig without whipping . . . even under pressures of deep drilling. Built-in coupling with leak-proof "Lip Lok" seal prevents blow outs. Write for Bulletin #6743.

R/M POLY-V* DRIVE—Patented heavy duty drive delivers up to 50% more power in the same space as conventional multiple V-drive . . . or equal power in ⅓ the space. Single unit belt design eliminates multiple-belt "matching" problems . . . assures more constant speed ratios, less wear on belt and sheaves. Belt inventories are reduced to a minimum. Write for Bulletin #6638.



- Positive Belt Length Control
- Smoother Running • Longer Life
- Belts Come Matched—Stay Matched



*Poly-V is a registered Raybestos-Manhattan trademark.

RM-821

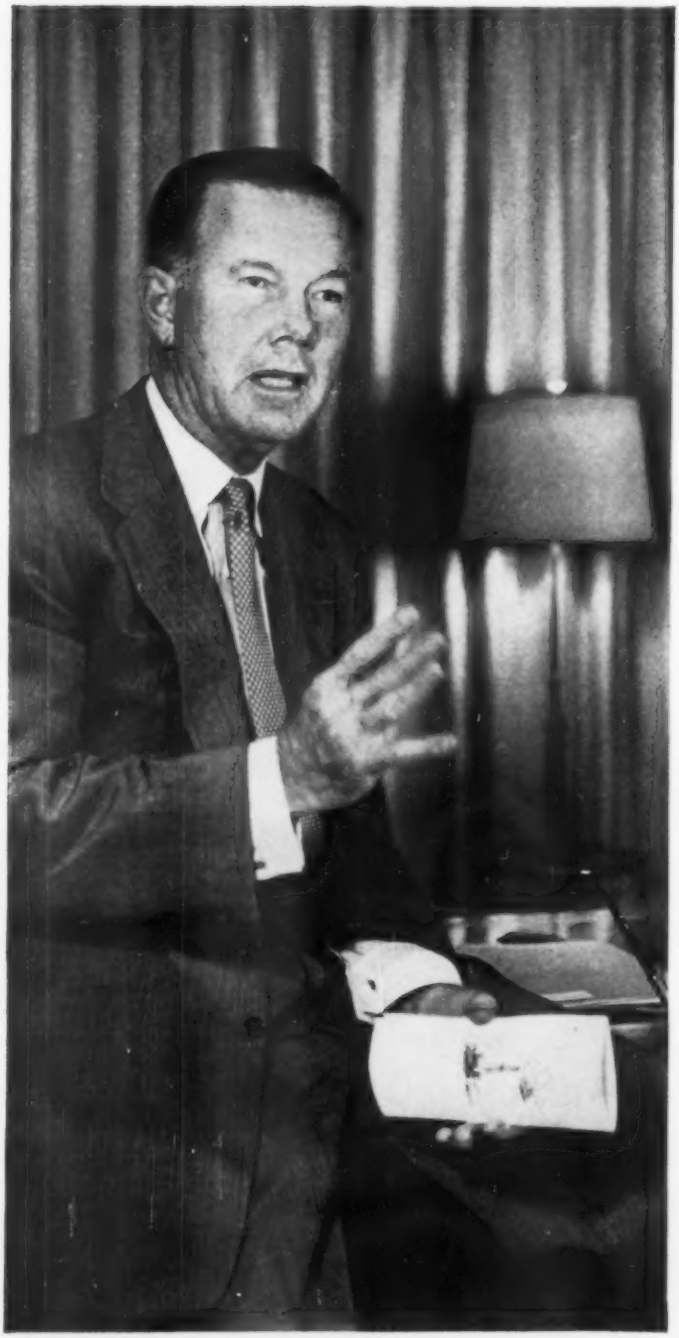
BELTS • HOSE • ROLL COVERINGS • TANK LININGS • INDUSTRIAL RUBBER SPECIALTIES

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products: Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

MR. L. F. McCOLLUM,
President Continental Oil Company



". . . hats off to supply men"

"Tremendous amounts of varied efforts and skills are required to search for oil and gas, drill wells, produce oil and gas, transport the energy 'in the raw,' process it, and distribute it in usable form to consumers.

"Each segment of the oil business is highly competitive, and each specialized group is convinced that its function is the true 'heart of the oil business.'

"In the complex structure of the oil business, *each* function is vitally important. The most important thing, it seems to me, is that our industry continues to provide the American public with energy in forms which contribute to our citizens' greater mobility, production of goods, comfort, and national defense.

"Oil men are risk-takers. The people who manufacture and sell equipment, service rigs, and do the actual drilling — they're risk-takers, too.

"The supply industry has played some long odds — and with about the same results the other segments of the industry have had in terms of successes and failures.

"My hat's off to the supply men. They supply first-class service to the men on the rig and to the men on production leases. And that's a genuine contribution to the success of our industry in its big job of serving the public."

P.E.S.A.*

* PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

PROUD TO BE PART OF A PIONEERING INDUSTRY

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

manager, field sales division. Millard was formerly storeman at the Canton, Ohio, store. He joined J&L as storeman at Pleasantville, Pa., in 1946.

R. A. Darling named

R. A. Darling

. . . vice president of Smithco Engineering, Inc., reports Orville L. Smith, president. Darling will serve as manager and coordinator for all sales activity for the company. He has formerly served with Cooper-Bessemer Corp.

H. J. Danne, W. D. Duwe named

. . . vice president of sales and engineering and general manager, respectively, of Industrial Fabricating Co., Tulsa. Danne, formerly with Standard Magnesium Corp., and Western

H. J. Danne

W. D. Duwe

Supply Co., has engaged in the sales and engineering of heat transfer equipment for 7 years. Duwe, previously with Coynco and Western Supply, has had 17 years' experience in the production of heat transfer equipment.

Lawrence E. Nelson named

L. E. Nelson

. . . vice president, sales, according to Arthur S. Hudson, president of Chrysler Marine and Industrial Engine Division. Nelson was formerly with Chrysler Motors Corp., Chrysler Corp., as director, marketing staff and more recently director, vehicle sales. His new duties will include establishing an expanded marine and industrial engine center and dealer network throughout the United States and Canada. C. C. Williams, previously vice president, sales, has been appointed divisional vice president.

BJ Service, Inc., names

. . . C. C. B. Moody as assistant to vice president of engineering and development, M. B. Riordan, reports

SAFER for FLAMMABLES

NEW LUFKIN "JET" TAPE

Here's the *safer* tape the oil industry needs for jet fuels. Stainless steel line is Chrome Clad®. Handle is wood. All other parts are non-sparking metals. See your Lufkin dealer for this new oil gaging tape.

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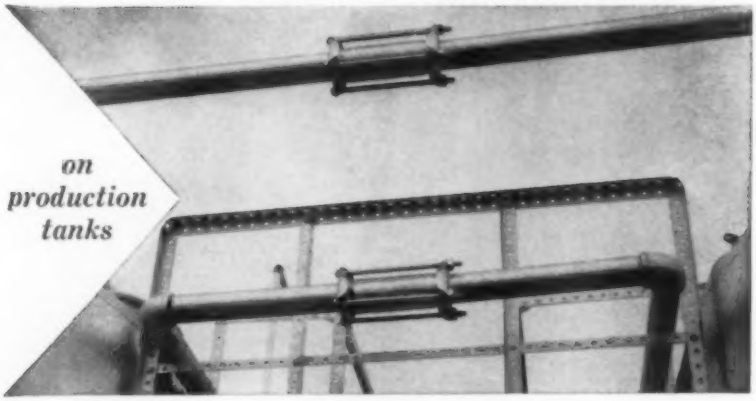

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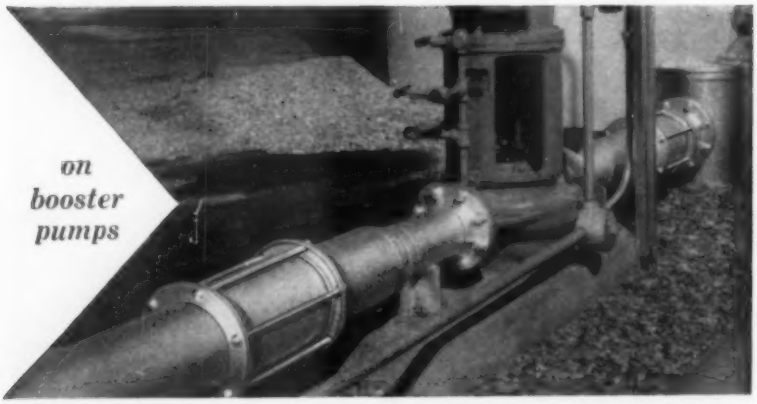

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executive vice president and general manager J. B. Merritt. Moody will help direct research and development activities in Long Beach and Breckenridge, Tex. He joined BJ in 1948.

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. . . by Union Tank Division of Butler Manufacturing Co. in Liberal, Kans., according to Marshall Stirling, sales manager. Billy Joe Nichols has been named manager of the newly constructed branch facilities. A complete line of Union equipment will be stocked at the 40-ft. by 60-ft. sales and service center.

Bethlehem Supply Co. promotes

. . . L. C. Graves, formerly in charge of subsurface equipment sales for the Gulf Coast division at Houston, to special representative, subsurface equipment, at Tulsa. His new responsibilities will be promotion of sales for Bethlehem Beeline subsurface pumps and sucker rods. He was formerly with Marion Machine, Foundry & Supply Co. before joining Bethlehem in 1939.

Axelson Mfg. Co. displays

. . . the longest stroke surface pumping unit in the world at the Permian Basin Oil Show, according to L. G. Evans, general sales manager of the division of the U. S. Industries, Inc. The show was held in Odessa, Tex., October 16 through 19. The stroke length of this new Axelson hydrax unit is 31½ ft. Seven of the 31-ft. units have recently been installed in the Permian Basin area for high volume and deep producing wells.

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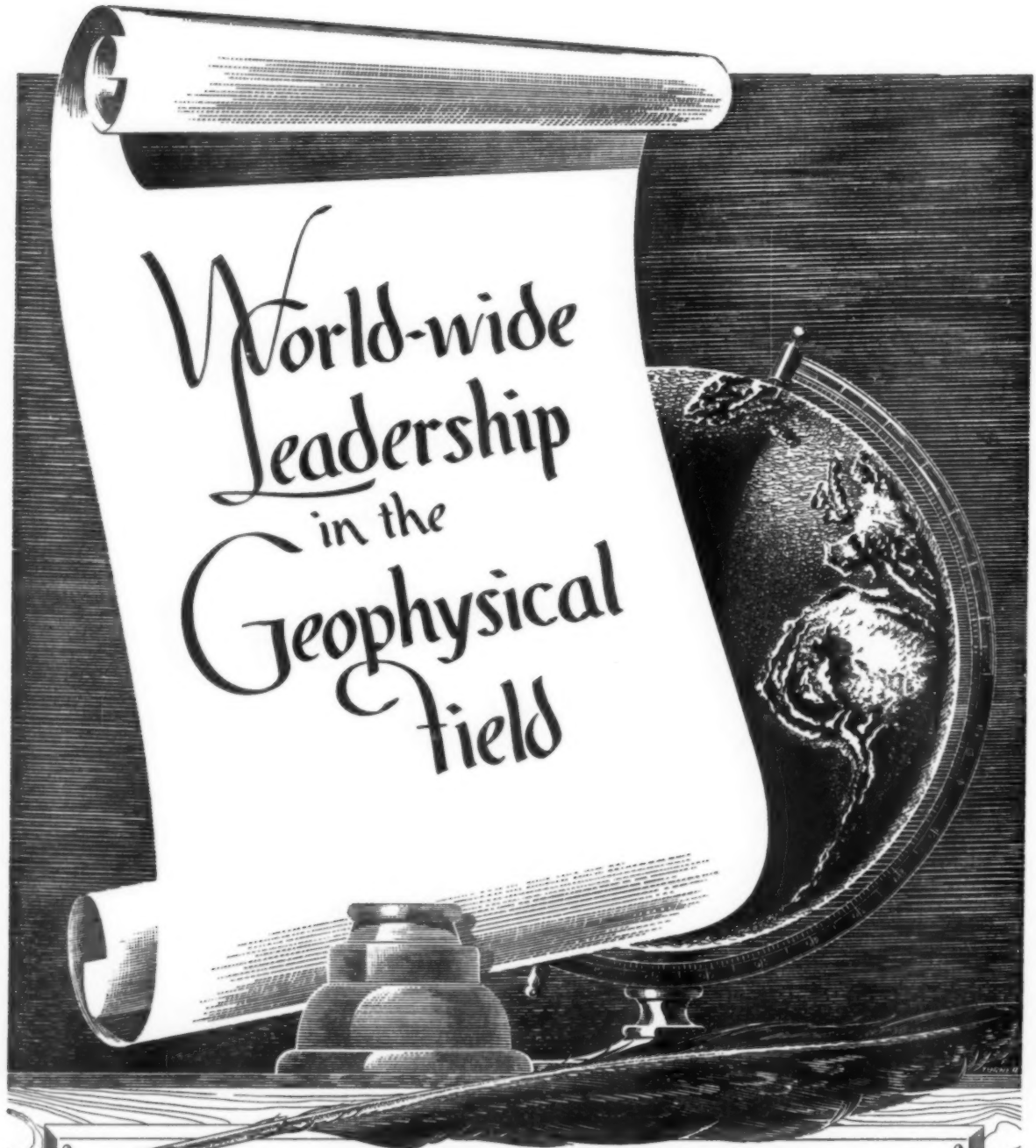

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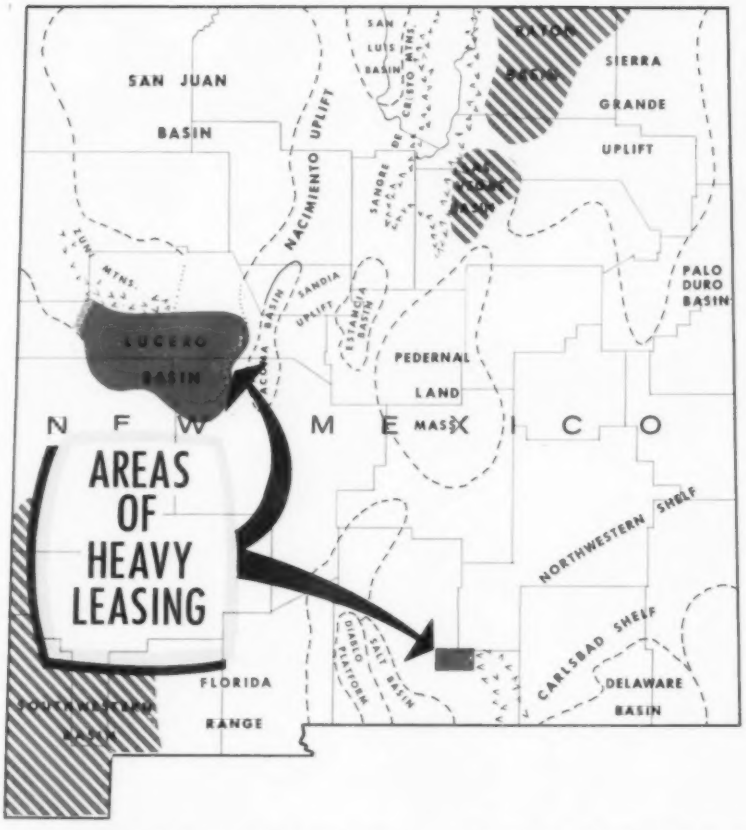


NEW MEXICO is still poorly explored, despite the years of drilling in its northwestern and southeastern corners. New leasing and drilling campaigns now under way may open up other areas to production.

What it takes to find

New oil in new places

BY FRANK J. GARDNER

YOU RUN INTO all kinds of conflicting opinions on the convention circuit these days. We're running out of oil, and we're drowning in oil. We've found all the good fields in this country, and we've only begun to look. The geologist berates management, and vice versa.

A three-pronged "if" . . . Who's right and who's wrong? Talk to 10 people and get 10 different answers. But talk to a hundred and you begin to spot a certain over-all feeling. And that feeling is one of confidence, especially among geologists. They believe that our job of finding U. S. oil reserves is far from finished. They are fully conscious of their shortcomings. So are the geophysicists. And out of this self-contemplation we can expect a lot of improvement in our oil finding success in the years ahead . . . **if.** The **if** is a big one, and it points in three directions.

If top brass and bankers can rid themselves of the closed-contour complex and acquire a deeper understanding of what makes a geologist tick, there'll be more oil and less dust. We'll get dry holes, but the success rate will rise.

If our schools will clamp down on unrestricted enrollment in geology as a snap course, and tighten the requirements for upper-class and graduate courses, they'll turn out more oil finders and fewer seekers of fringe benefits.

And **if** those geologists already on the payroll will sharpen their discovery wits and forget about the retirement fund, we'll see a great improvement in the oil-company annual report. "All we've got is a bunch of geological clerks, the greatest collection of discovery dullards in history," laments one chief geologist. There are two sides to this, of course; maybe the man at the top is guilty, too. But the general idea is basic. To find new oil in new places, we need well-trained graduates who can think and sell.

Leads to unlikely places . . . Some exciting new things are going on already because of the growing belief in the oil possibilities of unlikely places. Take New Mexico. For years, the wildcatter has been nibbling at the southeastern corner of the state. Only in the past 10 years has he dared to take a real chance in the northwestern corner, and the results are really gratifying. Now, for the first time, there's tangible evidence that he's going to take a fling at the vast unexplored region between those two corners.

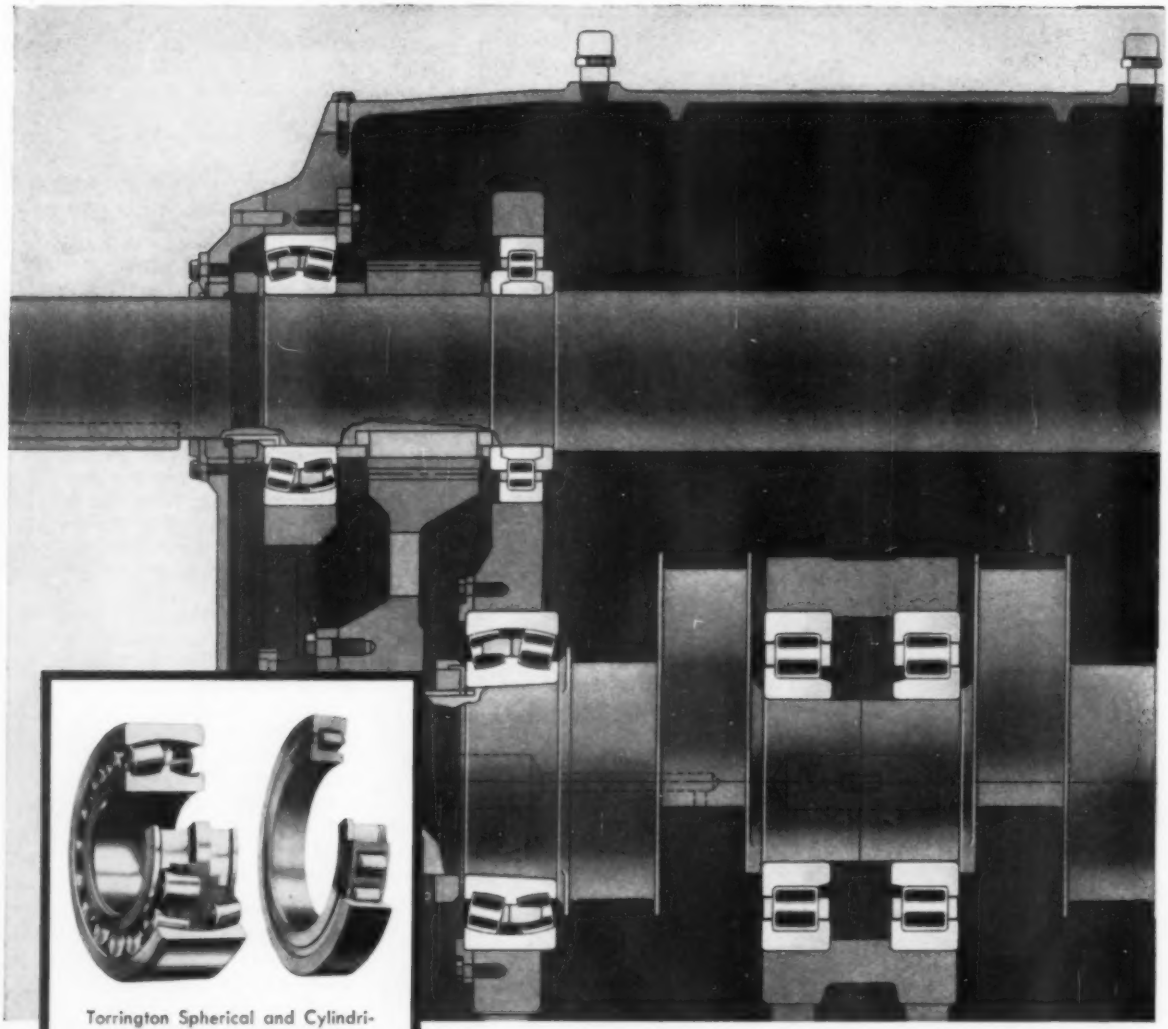
In recent weeks, heavy leasing has been going on in scattered areas all over New Mexico. Both major companies and independents are casting an eye at the chances for oil or gas in the smaller undrilled basins spotting the center of the state and in the northeastern and southwestern corners. Surely, some sound discovery thinking has preceded these plays.

In the southwestern corner, in Hidalgo County, Humble Oil & Refining Co. is drilling below 11,000 ft. at its 1-BA State. Here is a brave wildcat in a virgin area. The thickness of the sedimentary section already cut is a surprise to us all. Few geologists would have predicted more than 8,000 or 9,000 ft. of formation here. But finding the top of the Pennsylvanian at 9,330 ft. points to a lot more surprises to come.

In another area to the north of Humble's wildcat, a newly christened basin, the Lucero, is undergoing a leasing spree involving 4,000 sq. miles. This is a prelude to a drilling program there. On the next few pages, you'll find a geological appraisal of this spot by Sherman A. Wengerd.

At yet another remote location in southeastern Otero County, New Mexico, a spirited lease play on federal lands has blanketed some 250,000 acres there. Again, both majors and independents have jumped in to bet on the prospects of a brand-new theater of exploration.

So watch for more of the same. Geologists are eying many another undrilled basin, and this is all to the good. We'll always have conflicting opinions, but it's better that way. Remember, the Paradox basin was almost universally condemned for oil until some geologist thought otherwise.



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Lucero basin attracts wildcatters

. . . it's New Mexico's newest prospect

BY SHERMAN A. WENGERD

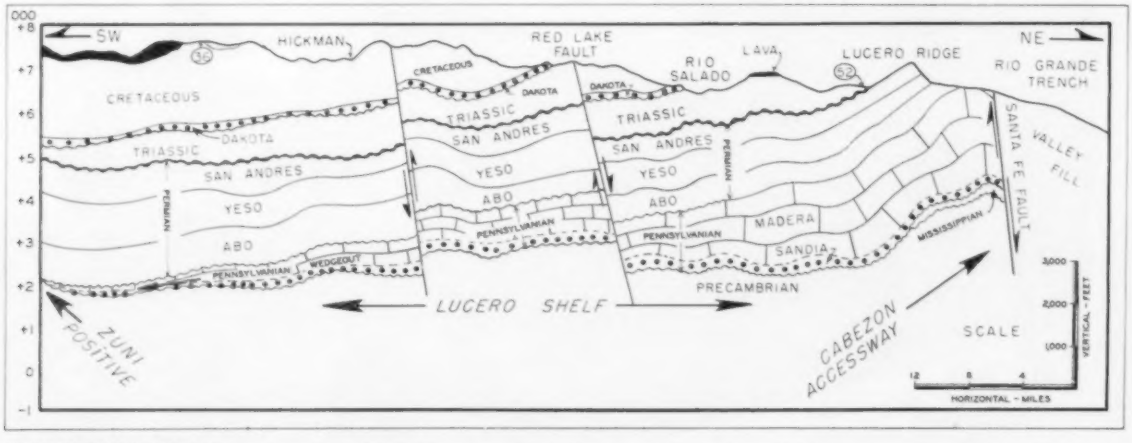
THE LUCERO BASIN is very similar in structure and topography to the larger San Juan basin to the north. Prospects for oil and gas accumulation should also be similar.

WITH THE ACQUISITION of 12,000 acres of Acoma and Laguna leases at the October 2 Indian-acreage sale in Albuquerque, Ula Mining Corp. revealed its vast acreage-ownership position in the Lucero basin of West Central New Mexico. The company had quietly gathered over 140,000 acres of federal, state, fee, and Indian leases surrounding the corner common to Socorro, Valencia, and Catron counties.

This large 4,000-sq.-mile area resembles in topography and structure the San Juan basin to the north. It lies southeast of the Zuni Mountains, south of the Acoma topographic basin, west of Lucero Mesa, northwest of the Ladron Mountains, north of the Datil-Mangas-Gallo Mountains, and east of the Zuni-St. Johns embayment along the Arizona-New Mexico line. The area of concentration by Ula encompasses over 72 townships in the region of Townships 2-9n, and Ranges 3-11w.

Ula Mining Corp. assembled drilling blocks covering all or parts of 30 anticlines and tilted structural noses in the area. There are good-to-excellent opportunities for oil and gas production from Gallup, Tres Hermanos, Dakota, San Andres-Glorieta, Yeso-Abo, and Pennsylvanian strata lying at depths of 600 to 8,000 ft. in the newly named Lucero basin. Closures on the larger low flank-dip anticlines

Author is petroleum geologist, Albuquerque.



SOUTHWEST-NORTHEAST cross-section of the Lucero basin depicts position and probable structural attitudes of the subsurface beds.

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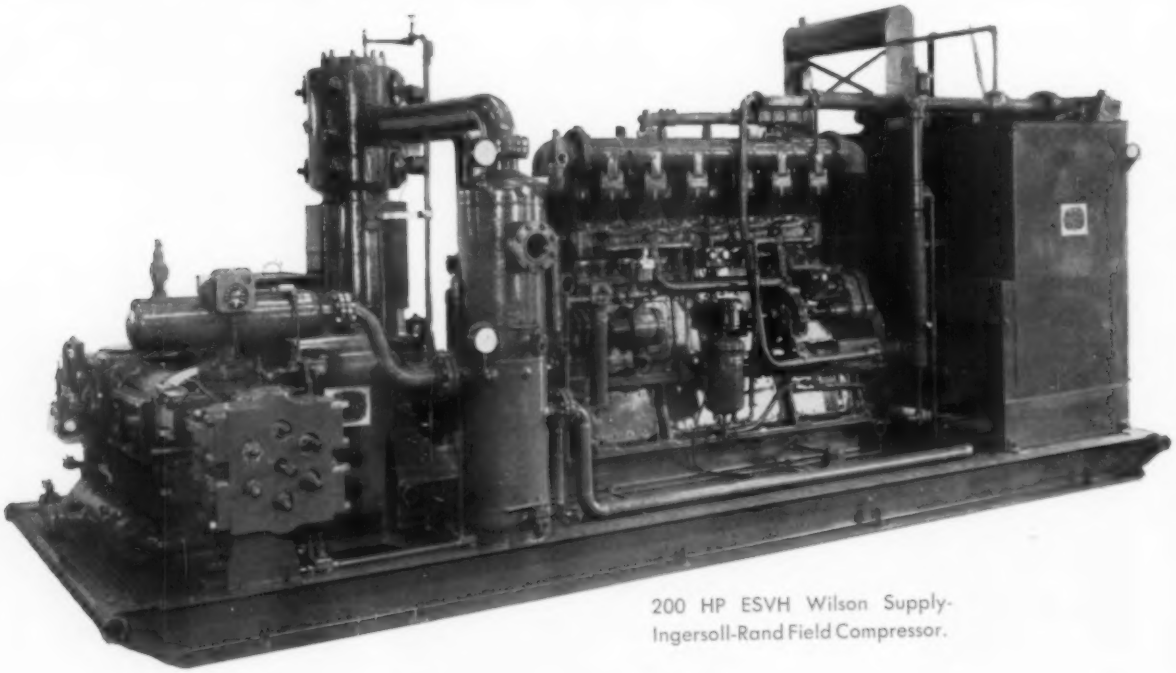
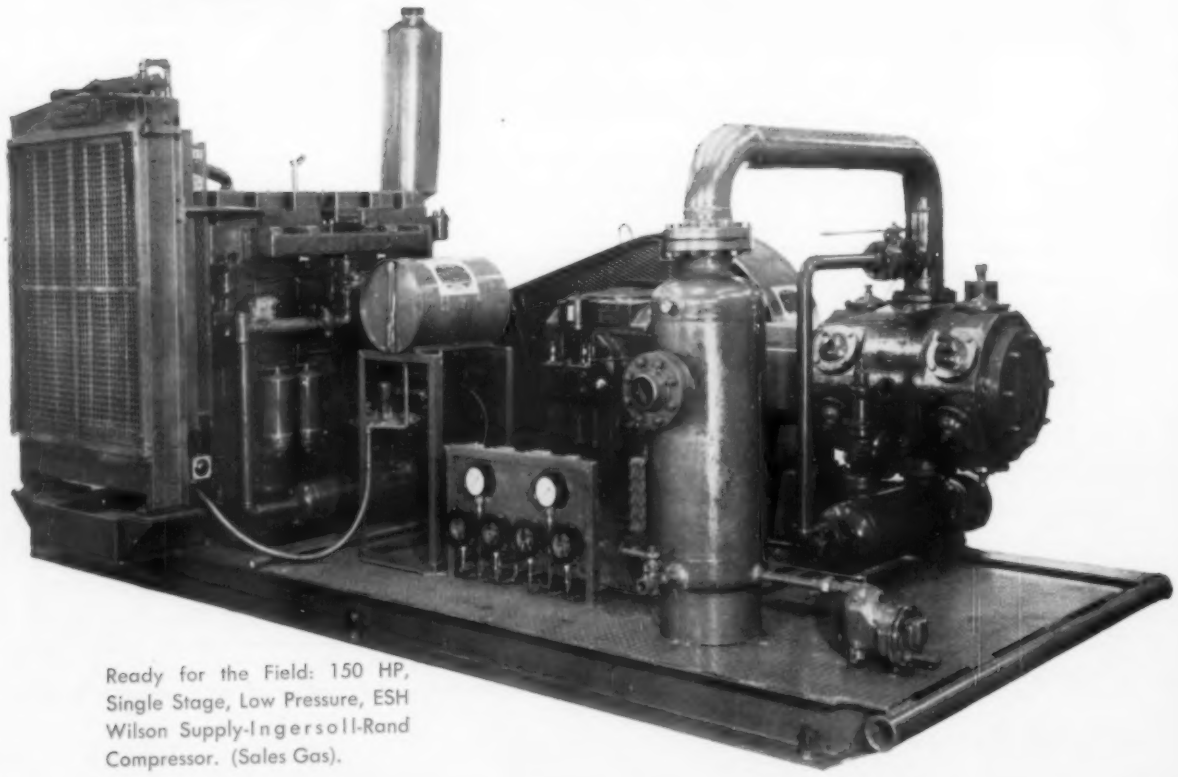


200 HP ESVH Wilson Supply-Ingersoll-Rand Field Compressor.



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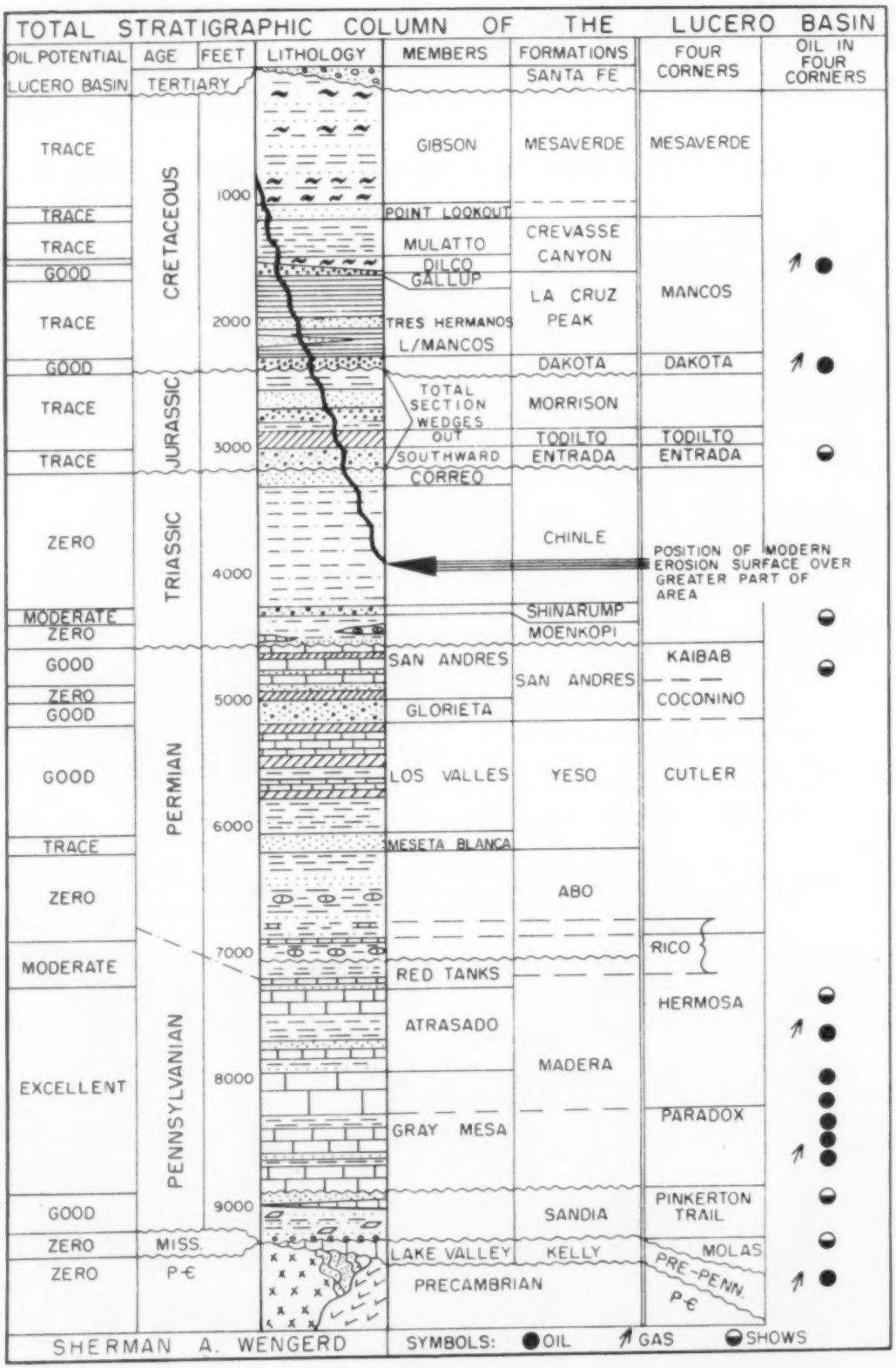
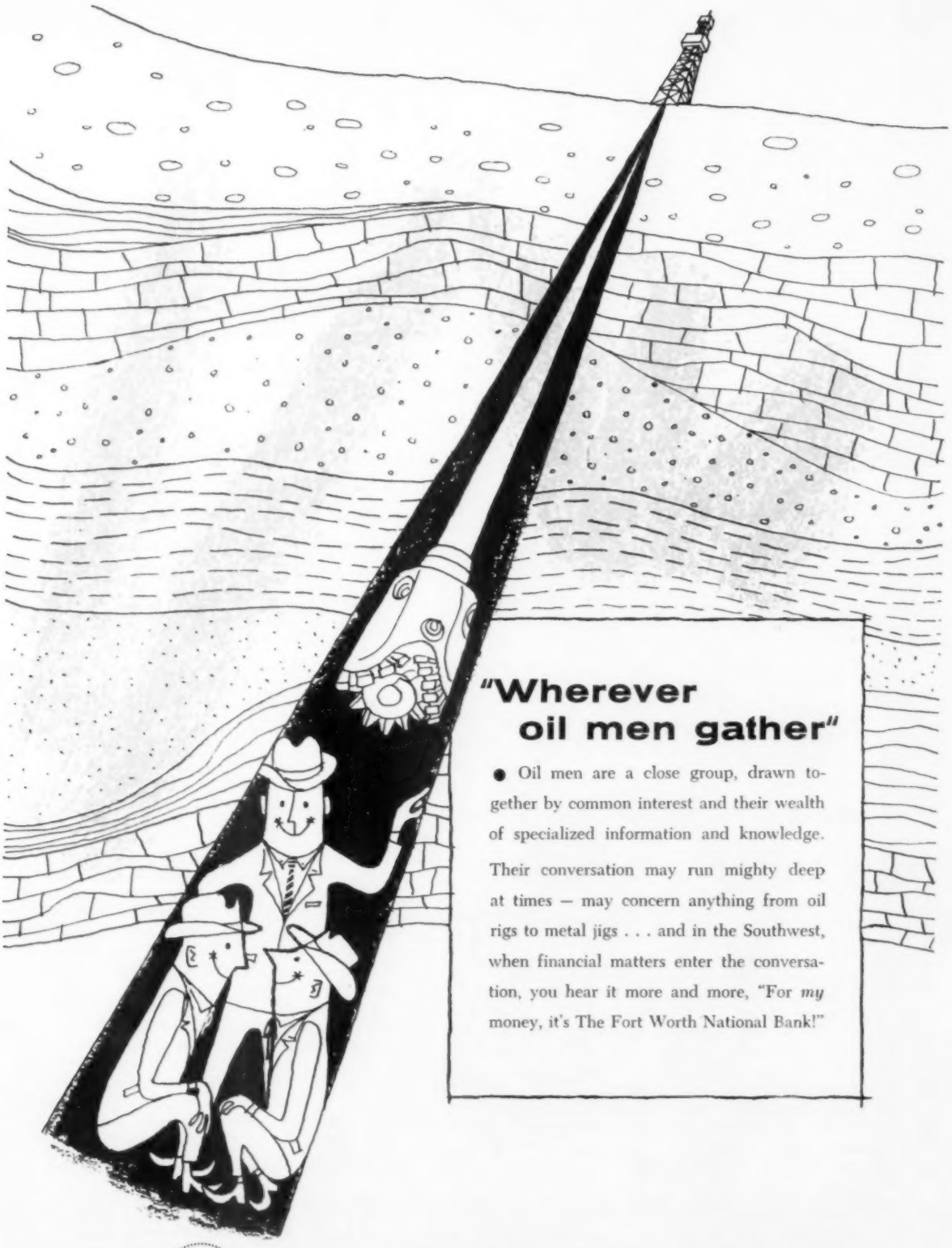


THIS CHART correlates the stratigraphic section of the Lucero basin with that of the Four Corners region and indicates oil and gas potential of each formation.



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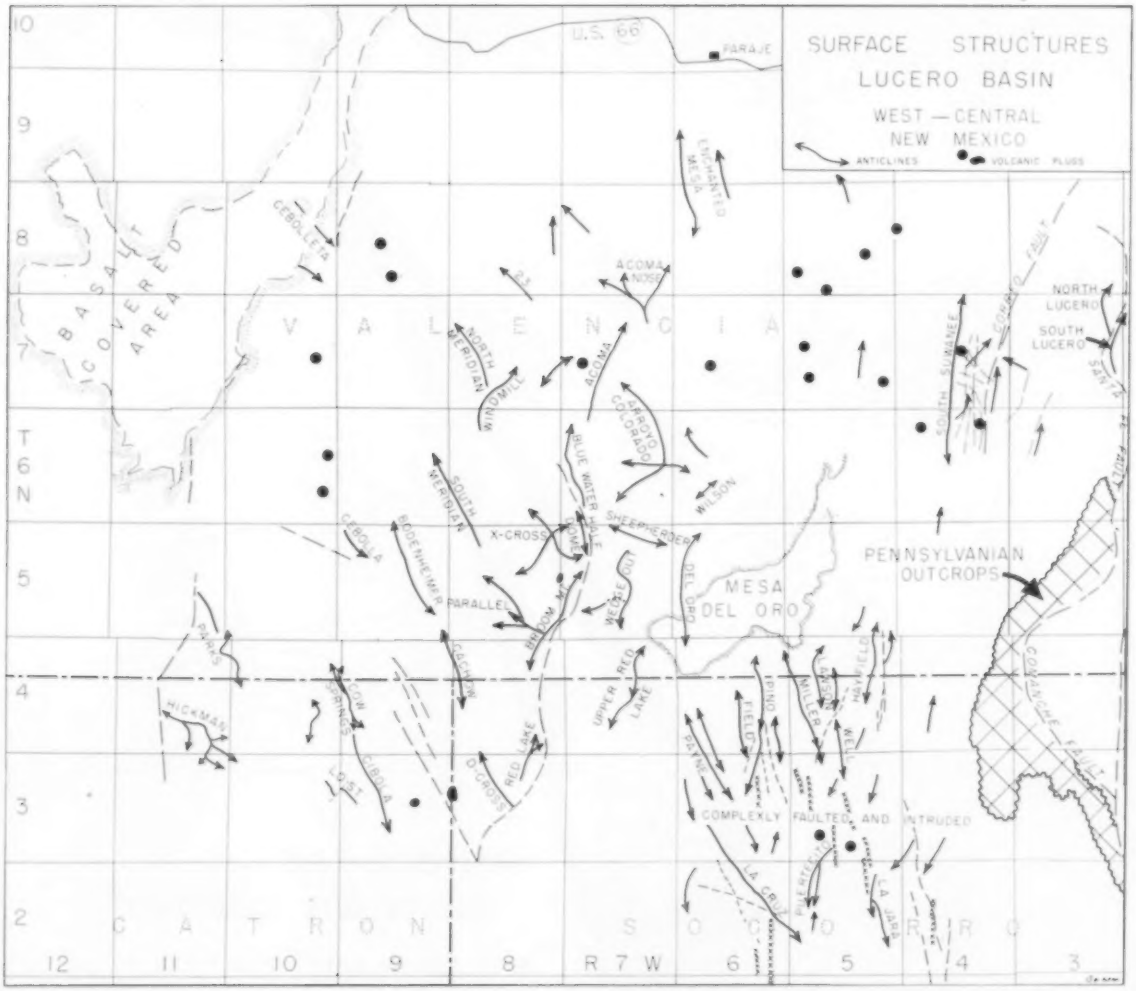

LOCAL STRUCTURES in the Lucero basin area. More than 30 individual structural anomalies have been discovered from surface work.

range from 50 to 250 ft., with several closures against the Hickman and Red Lake faults ranging up to 500 and 750 ft. A six-well drilling program is planned.

The Pennsylvanian Madera and Sandia formations are known to wedge westward from about 2,800 ft. near the north-south axis of the Cabezon-San Mateo seaway which joined the Paradox-San Juan basin areas on the north to the Sonoran basin on the south in Mexico. The wedge edges of the Sandia and Madera formations, which are time equivalent to the Hermosa and Paradox formations in the Aneth area of Utah, lie south of the present Zuni Mountains in the locale of an old Pennsylvanian positive area. Thus, the Pennsylvanian rocks are the prime objective both in closed structures and in stratigraphic traps in the forthcoming wildcat drilling program by Ula.

The area has been dormant for petroleum exploration because of the intense interest in the San Juan and Paradox basins to the north, where Cretaceous and Pennsylvanian beds equivalent to those present in the Lucero basin are productive in Bisti and Aneth fields. Another complicating factor has been the intricate land-ownership pattern, which was solved by the acquisition of leases from New Mexico-Arizona Land Co., the Santa Fe Railway, and in the Acoma-Laguna Indian sale.

A third factor which has deterred drilling in the area is the existence of volcanic necks on the northeast, west, and south, with a part of the area being covered by the Mesa del Oro and Cebolleta thin-lava flows. Geologists now do not consider these late Tertiary and Quaternary flows to be detrimental to the search for oil. Four deep tests have been drilled in the area, only one of which, the old 1 Mitchell-Red Lake in northwesternmost Socorro County, was drilled to Precambrian rocks near Ula leases.

The oil potential of the region lies in the Gallup-Tres Hermanos-Dakota sandstone of Cretaceous age, in the San Andres-Glorieta section of Permian age, in the Atrasado and Gray Mesa carbonates of the Madera formation, and in the Sandia formation of Pennsylvanian age. Nearest Pennsylvanian oil production is at Rattlesnake and Hogback fields, 120 miles to the north; the nearest Pennsylvanian gas production is at Barker dome, 130 miles to the north; the nearest Cretaceous oil and gas production is about 60 miles to the north; all of these areas are in the lucrative San Juan basin.

Stratigraphy

The Lucero basin region is underlain by Pennsylvanian marine rocks which wedge from 2,800 ft. on the east to zero on the west; Permian continental and marine rocks which wedge from 2,800 and 2,600 ft. on the southwest to 2,000 ft. on the northeast; Triassic continental rocks which

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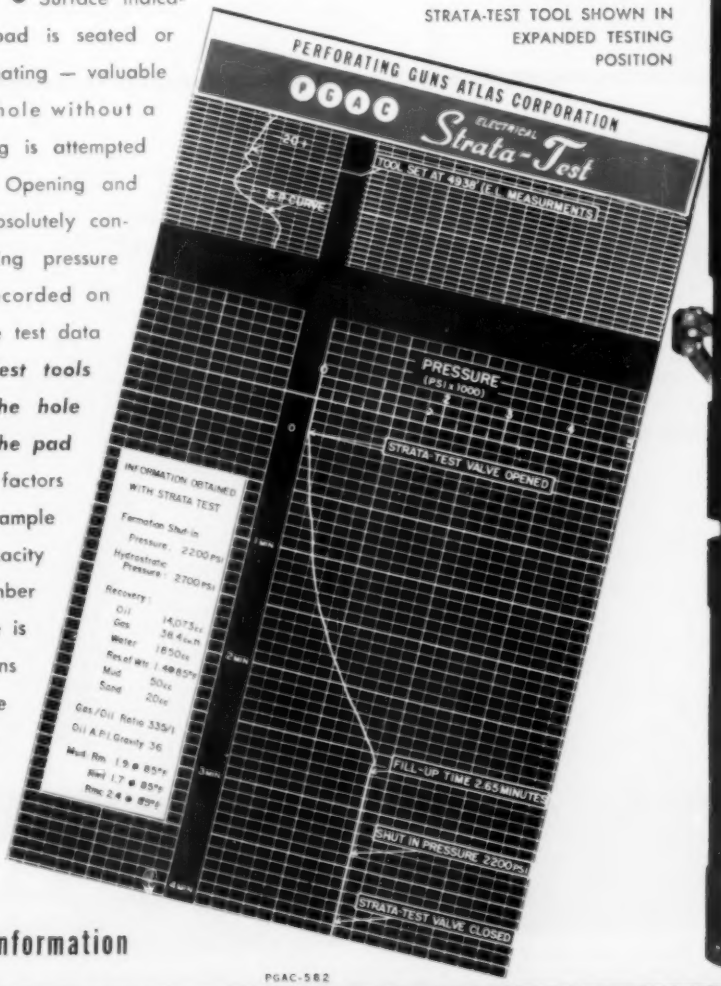

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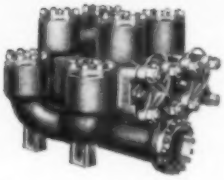

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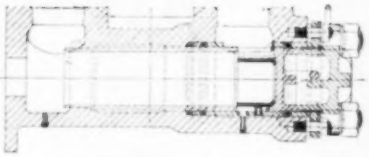

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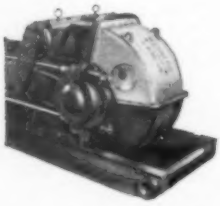

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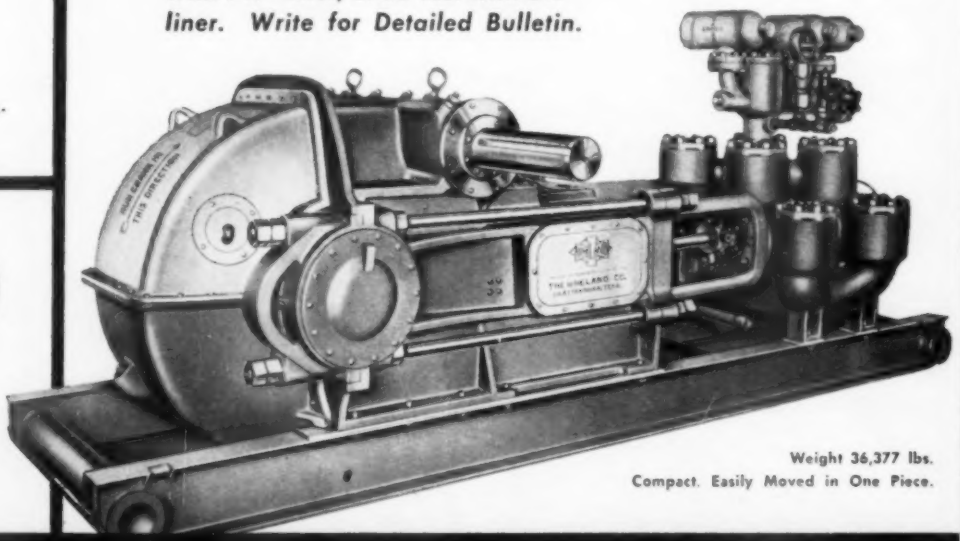

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wedge from 1,700 ft. on the northeast to zero on the far southwest; Jurassic continental rocks which wedge from 800 ft. on the north to zero in an east-west trend across the medial part of the Lucero basin; and Cretaceous marine rocks, absent by erosion over the eastern one-third of the region, but ranging from 1,000 to 2,000 ft. throughout the western two-thirds of the region.

The total stratigraphic section in the area of maximum oil potential thus ranges from 4,000 to 8,000 ft. in thickness.

Structure

The regional dips today are generally westward from the Lucero uplift on the east, questionably northward from beneath the volcanic mountains on the south, eastward from the Zuni-Manuelito-Pinon Springs fault system near the Arizona line on the west, southwest-south-southeastward from the Zuni uplift on the northwest, but northward into the Acoma embayment which leads into the San Juan basin on the north.

The structurally highest part of the Lucero basin lies in the area of Townships 5-6n and Ranges 7-8w. The major Red Lake fault projects northward into the south edge of this area, whereas the Hickman fault system trends northward through Range 10w, from Township 2n to Township 7n. Between the two fault systems lies a vast regional horst in the Lucero basin, and a north-south trend in Range 6w is a regional sag.

Local structures comprise over 30 broad low anticlinal noses, structural terraces, broad low-closure anticlines, and sharply folded high-closure, faulted anticlines. All of these show diverse trends which indicate a complex geologic-tectonic history so typical of oil-productive regions throughout the Rocky Mountains.

Geologic History

Remnants of Mississippian limestones on the southeast edge of the area, combined with Pennsylvanian rocks lying on Precambrian "granite" over the remainder of the Lucero basin region, suggest that erosion predominated during all of early Paleozoic time.

During Pennsylvanian time, this region was a broad westward-projecting sag off the Cabezon-San Mateo marine accessway which joined the Paradox basin on the north to the Orogrande basin on the south. This marine accessway ranged from 40 to 100 miles in width, and up to 3,000 ft. of Pennsylvanian sediments were deposited in it. Pennsylvanian sedimentation was limited on the west by the Zuni positive area which shed clastic sediments across the Lucero shelf. Coarser clastic sediments came into the region from the Penasco and Pedernal uplifts on the northeast and east. The predominant Pennsylvanian strata, however, are shale, limy shale, shaly limestone, and limestone where the section is thickest near the axis of the accessway, to massive carbonates, possibly of reef origin, westward across the break-in-shelf slope within the present Lucero basin region.

Because correlative strata are involved, the stratal situation is analogous to that on the southwest flank of the Paradox basin where Aneth field is located, with the exception that no Paradox evaporites are known to be present.

Following Abo continental red-bed deposition in Permian time, the Quemado-Cuchillo (St. Johns) axis came into existence, and marine Permian strata were deposited along the southwestern two-thirds of the Lucero region. Triassic and Jurassic continental sedimentation followed, with northward and northeastward tilt of the region and erosion preceding Cretaceous marine invasion from the north and northeast.

With several minor exceptions, the geologic history of the Lucero region is much like that of the Four Corners region, inasmuch as drape structures and minor folds were accentuated during the Laramide folding at the end of Cretaceous time. Tertiary faulting and scattered volcanism followed by erosion produced the scenery of today on this southeastern segment of the Colorado plateau.

Oil Potential

Wide areas of the Lucero basin, which have suffered no volcanism, little faulting, and show no reasons for postaccumulation destruction of oil pools, have not been touched by the drill. The problem is thus one of drilling the least number of holes necessary to delineate the stratal porosity trends in relation to the known surface structure.

There have been virtually no deep tests in the Lucero basin, except for three closely bunched tests with Pennsylvanian oil and gas shows on the northeast corner in the South Suwanee area, one in the Lower Red Lake area on the south-central side, and one far to the west of the area of interest. Hence, there are no subsurface data. A shallow well in the south-central part of the region found a strong oil show in the Dakota sandstone. The focus for drilling must then be p r o v i d e d by projection coupled with locations on mapped surface structures.

TIME OUT BETWEEN PAPERS at the first annual meeting of Southwestern Federation of Geological Societies, Mineral Wells, Tex., October 22-25. Federation of nine groups of geologists makes it possible to bring them together for presentation and study of problems of mutual interest. Member societies are those of Dallas, Fort Worth, Wichita Falls, Lubbock, Abilene, San Angelo, Midland, San Antonio, and Roswell. The Wichita Falls society was host this year. The meeting attracted over 600 geologists, from Southwest Texas to the West Coast. In the picture, standing back row: Gordon T. Atwater, Robert Dott, Norman C. Smith, Ross H. Ley, William J. Wilson, Frank Perkins, Jr.; front row: Sherman A. Wengerd, Graham Moody, George S. Buchanan, Lefty Ellsworth, and Gene Couch.

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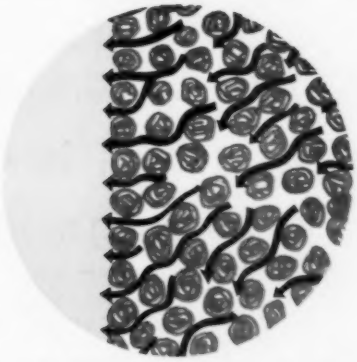

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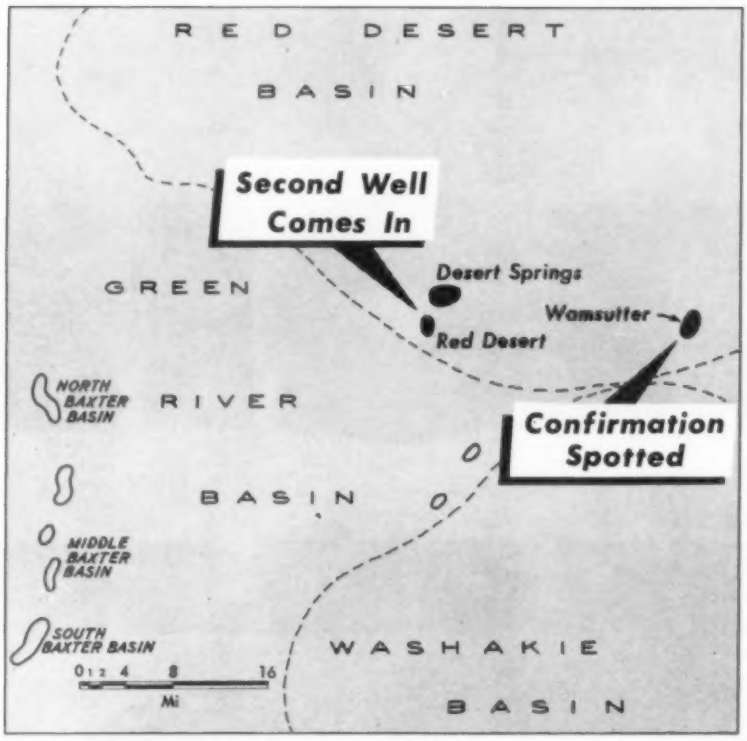

GAS EXPLORATION in Wyoming's Red Desert basin continues its fast clip with success reported at the second Red Desert field well and a confirmation try slated for Ohio's Wamsutter Unit.

Second well is success in Wyoming's Red Desert

WYOMING'S Red Desert basin portion of the Green River basin continues to highlight Rocky Mountain gas exploration.

The newest wildcat news in this wide-open drilling country is Pubco Petroleum Co.'s success at 8-1 Pubco-Playa-Federal, NE SW NE 8-20n-98w. This is the second well in new Red Desert field.

The Sweetwater County well got gas at the daily rate of 7,000 M.c.f. on drill-stem test at 5,504-57 ft. These tests are in the Almond, reportedly. Location is 1½ miles southeast of the discovery well, 34-1 Federal, which flowed gas from both the Lewis and Almond.

Pubco controls nearly 10,575 acres on the Red Desert prospect (part of the proposed 22,538-acre Playa unit). The new gas area is southwest of Desert Springs, considered to be the gas discovery of the year in Wyoming. That field has Lewis and Mesaverde gas production.

Wamsutter . . . East of the Red Desert play, Ohio Oil Co. announced plans for confirmation to its recent Wamsutter unit discovery. The new well is the A-2 unit, C SE 14-20n-95w, about 1½ miles southwest of the unit discovery well. That well flowed 7,500 M.c.f.d. of gas from Mesaverde formation.

California wildcatters push search for natural-gas discoveries

FACED with a steadily lessening demand for California crude, wildcatters are looking more and more to natural gas with their drilling plans.

A current rundown on the search for gas reserves looks like this:

San Joaquin Valley . . . Porter Sesnon, et al., 50-50 partner with Great Basins Petroleum Co. in substantial holdings in the Vernalis gas field, San Joaquin County, recently completed its second big producer in the field with a third ready to be completed. The second well, 33-22 Sesnon-Giambastiani, was brought in flowing 12-15 M.M.c.f.d. It is located about ⅔ mile west of the Sesnon discovery well.

The third Sesnon well is about 1 mile northwest of the discovery. A fourth well is being readied at a site 4 miles southwest of the big 33-22 Sesnon-Giambastiani.

In addition, Standard Oil Co. of California, discoverer of the first gas production in the area in 1941, was completing an offset to the southeast of the Sesnon Vernalis gas discovery made last May.

Coastal division . . . Standard Oil Co. of California completed a wildcat 2 miles northeast of the old Elwood oil field in Santa Barbara County as a new gas-field find. The wildcat, 1 Roy Eaton, et al., was completed flowing 1,700 M.c.f.d. Total depth of the test is 3,596 ft.

The coastal division has been of minor importance in California's natural-gas history. The only significant gas find there was the old Goleta gas field which has long been depleted and is now being used as an underground-storage facility.

Sacramento Valley . . . The bulk of gas search activity in California continues to be in the Sacramento Valley in the north-central part of the state. A recent rig count showed six wildcats drilling and three development wells under way. The wildcat picture looked like this:

. . . Humble Oil & Refining Co. had two wildcats drilling. One was making hole on an extension test in the Princeton gas field in Colusa County. The other was a wildcat in the northeast Orland field in Tehama County.

. . . The Beehive Bend gas field in Glenn County showed the most activity with two extension tests drilling, one by Balkan Corp., and the other by Sherman F. Wagenseller. The wildcat was being drilled by Ferguson and Bosworth, operators, several miles north of the nearest Beehive Bend producer.

. . . In Sacramento County, Brazos Oil & Gas Co. was testing a 10,902-ft. extension in the River Island gas field.

. . . In Solano County, Kern Oil of California, Ltd., was drilling a wildcat near Dunkerton.

. . . In Tehama County, Buttes Gas & Oil Co. was drilling a wildcat in the South Dome area.

In addition to the above active projects, these wildcat locations were announced recently:

. . . Humble staked location for a wildcat 1½ miles southeast of the Durham area in Butte County.

. . . The Balkan Corp. and The Kenson Corp. of Texas each an-

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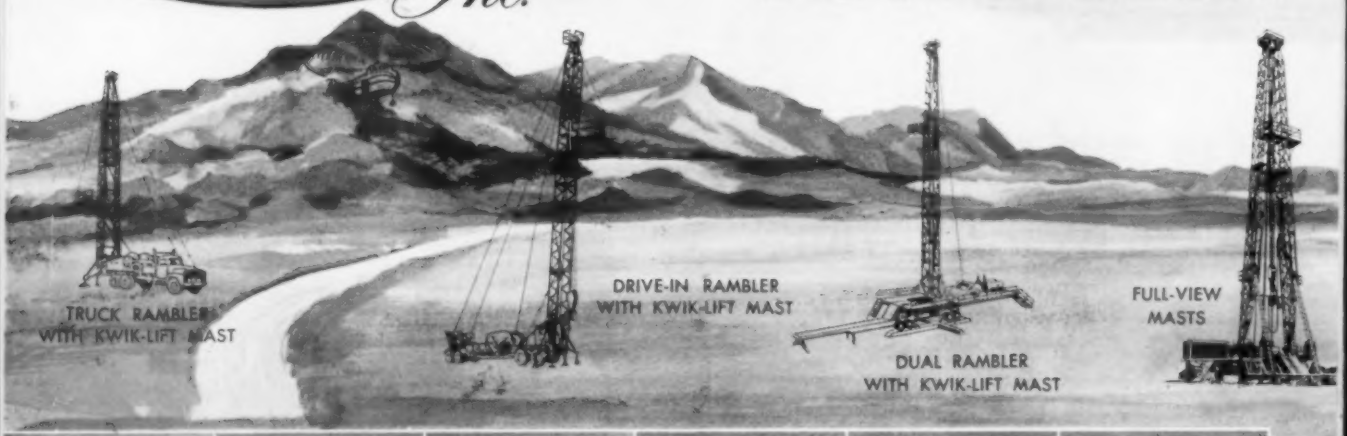

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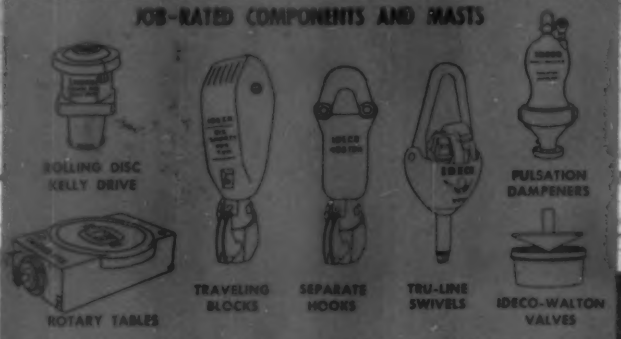

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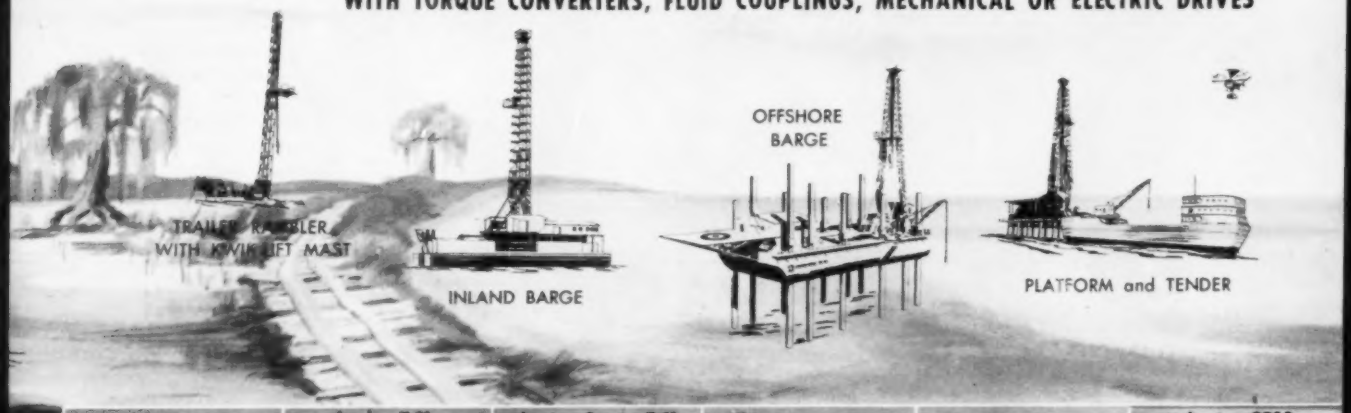

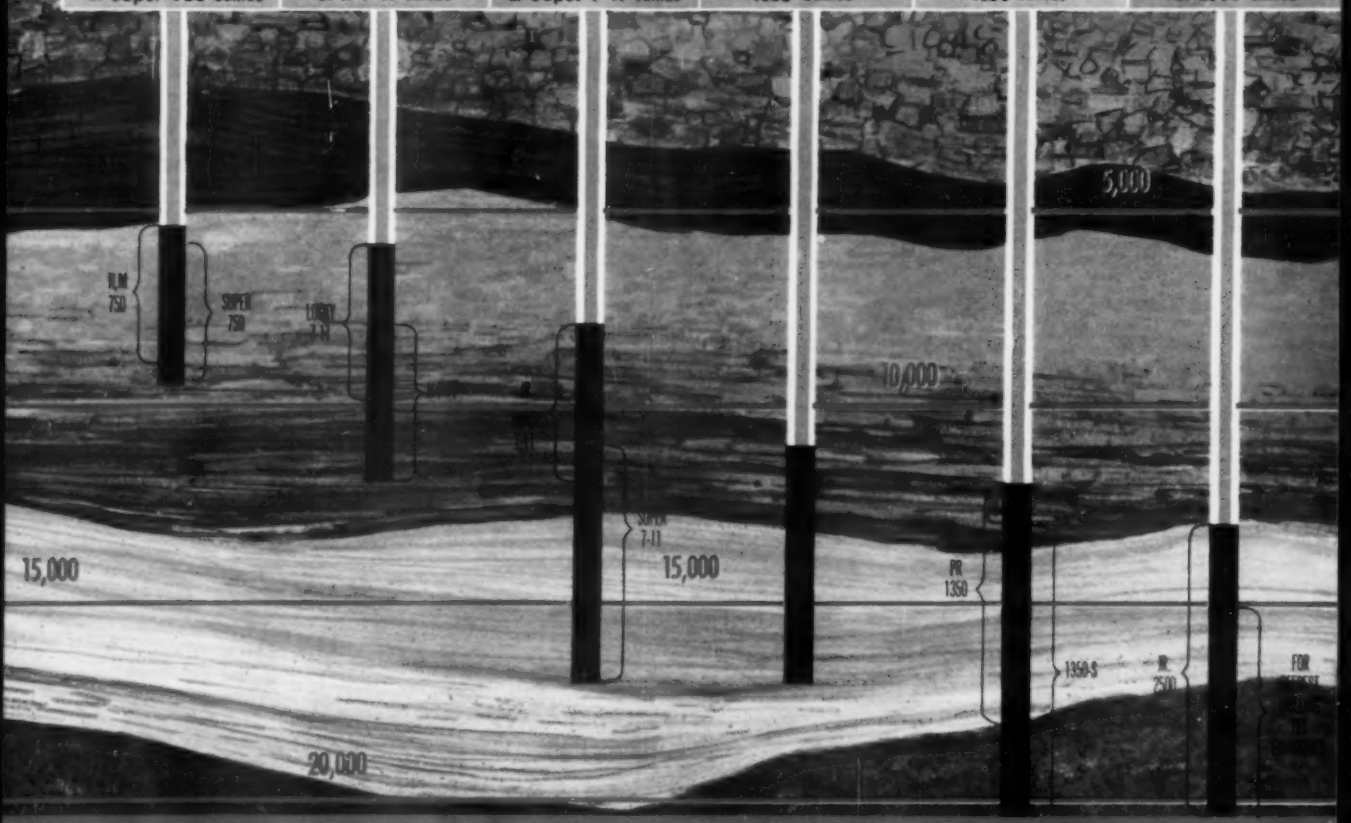

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nounced plans for extension tests in the Beehive Bend field.

... **Kohlbush and Campbell** will drill a wildcat 1½ miles north of the Schohr Ranch gas field in Butte County.

... **Western Gulf Oil Co.** was readying a location for a wildcat in the Wild Goose field area of Colusa County.

California highlights . . . Shell Oil Co. abandoned a 6,598-ft. wildcat in Harmon Canyon, 4 miles west of the south edge of the Saticoy field in Ventura County . . . Hudson Gas & Oil Co. announced plans to drill a third wildcat on its Los Angeles Country Club lease . . . John M. Young suspended operations at 5,600 ft. on his wildcat 1¼ miles southeast of Half Moon Bay field in San Mateo County. This old field dates its discovery back to 1886.

Two Sooner fields nearing linkup

LINKUP IS NEAR at Harper County's West and Southwest Stockholm fields in northwestern Oklahoma. The key well is Sinclair Oil & Gas Co.'s 1 Gebhardt-Zollinger in C NW SE 10-26n-24w.

Gas flowed from the Morrow and Chester at this well. From the Morrow, topped at 6,763 ft., gas volume built up from 6,160 M.c.f. in 5 minutes to 11 M.M.c.f. in 20 minutes.

Doby Springs . . . In another important Harper County development, Calvert Drilling Co. extended Morrow-Pennsylvanian production at 1 Shuman in SW 24-28n-24w. This one got 2,530 M.c.f. of gas on drill-stem test at 6,166-80 ft. Recovery was 150 ft. of clean distillate. Location is 3 miles north of the discovery well of the field which is in 1-27n-24w.

Desert Springs well dually completed

DUAL COMPLETION is reported from Wyoming's Desert Springs Unit. Gulf Oil Corp. finaled the 1 May-State in C SW 36-21n-98w, Sweetwater County, for 36,200 M.c.f.d. of gas.

Flow of 33 M.M.c.f.d. from Mesaverde-Cretaceous perforations at 5,936-56 ft., and 3,200 M.c.f.d. of gas from the Lewis-Cretaceous made up the combined total. The Lewis was perforated at 5,208-30 ft. This is the field's first dual completion.

Michigan's St. Clair sparks oil play

THE MICHIGAN OIL INDUSTRY continued to brighten as the second oil play in St. Clair County appeared assured and wildcat drilling in southern Michigan stepped up.

Fisher-McCall Oil & Gas Co. 1 Taetz, SE SE SW 31-4n-15e, flowed 6 bbl. oil per hour pinched after 250 and 1,000-gal. successive acid treatments to basal Salina pay to 2,559-62 ft.

The well offsets an earlier-drilled Panhandle Eastern gas well, and was drilled on a Carter Oil Co. farmout. Taetz well is located 5 miles southwest of Peters-Casco Niagaran reef oil field.

Indicative of increasing interest, Panhandle Eastern staked three locations, McClure and Musgrove one, and Glen Mills spudded a wildcat at C NW 20-4n-16e, China Township.

Tom Mask and McClure Oil Co. 1 Rosenau, NW NW SW 23-3s-4w, Calhoun County wildcat, logged Trenton at 3,888 ft. and logged porosity zone and oil show to 3,951 ft. where drilling was suspended to cement 5-in. casing at 3,902 ft.

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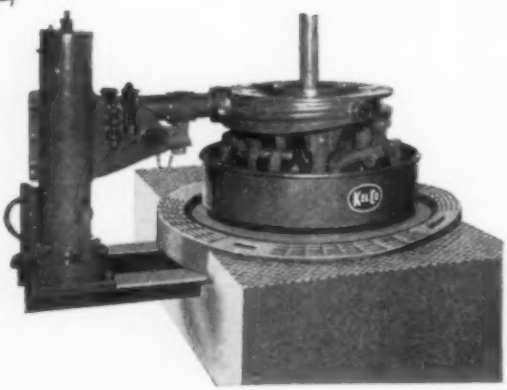

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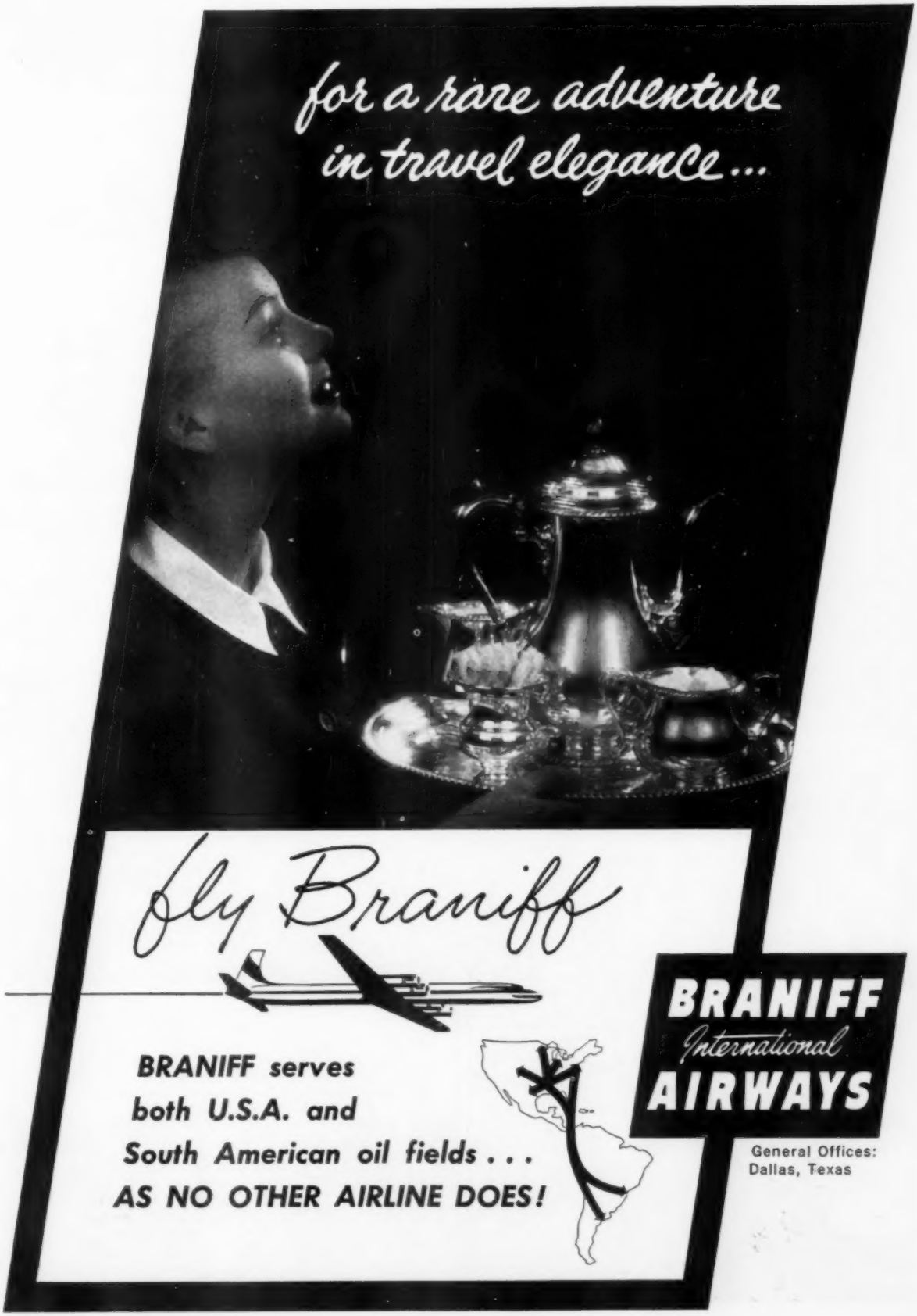
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GOR proration set for St. Clair

FOLLOWING public hearing October 23 in Lansing, Mich., State Supervisor of Wells Gerald Eddy on recommendation of the advisory board, fixed gas-oil-ratio proration program of 100 bbl. of oil and/or 150 M.c.f.d. gas maximum on the Casco-Peters oil field, St. Clair County. The order was effective November 1.

State petroleum engineers and private company representatives agreed at the hearing that the Peters field, producing from the 2,400 to 2,800 ft. Salina-Niagaran beds, is a "common petroleum reservoir with gas cap overlying the petroleum reservoir." Over 200 ft. of pay section has been cored. State engineers said observed surface and bottom-hole pressure tests and gas-oil-ratio measurements evidenced relationship through the entire zone. This testimony resulted in reclassifying the field from a gas field to an oil field.

Previously the one gas well in the field had been permitted withdrawals of about 1 M.M.c.f.d. on an annual basis. Under the new order gas withdrawal will be restricted to 150 M.c.f.d., with or without oil.

The advisory board also recommended, and the supervisor made it part of the formal order, that operators form a field study committee to consider in particular:

1. A unitization program for the reservoir.
2. Repressuring by injection of produced gas.
3. Prevention of waste by use or sale of produced gas.

Another discovery for NW Kansas

NORTHWESTERN KANSAS has picked up another important Pennsylvanian discovery. Jackson and Shear swabbed 8 bbl. of oil hourly from the 1 Waterman in C SE SE 15-4s-33w, Rawlins County.

Production at this new field opener in the busy northwestern Kansas area is from the Marmaton at 4,280-88 ft. It is northeast of recently opened Sappa Creek field.

Southwest . . . Far to the southwest of Rawlins County inside Hugoton field, White Eagle Oil Co. reported the development of a new pay zone at Pleasant Prairie field, Haskell County.

The new pay is the Kansas City-Lansing Pennsylvanian lime which was tested in White Eagle's 14-1 U.S.A. in NE¼ NE¼ SW¼ 14-26s-35w, Southside pool, Kearny County. The well was perforated from 4,129-42 ft.; after acid treatment it was swabbed for 24 bbl. hourly. After being put on pump the well made 104 bbl. of oil daily.

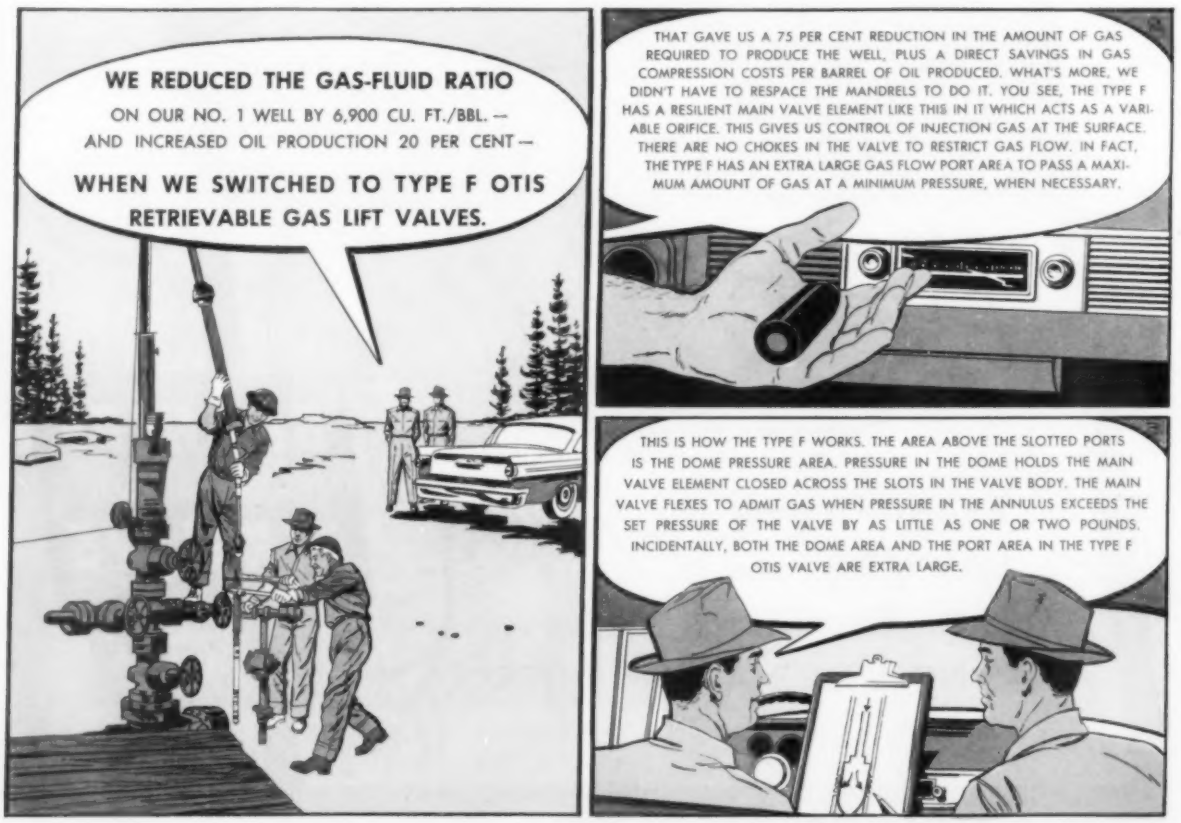
The 14-1 U.S.A. was originally completed in September 1957 in the Mississippian. This is the pay zone from which White Eagle's 22 other wells in the area are producing. Two rigs are at work on a steady development program on the company's 25,000-acre block.

New well for Sandy Creek field

SOUTHERN OKLAHOMA'S newly opened Southwest Sandy Creek field, Murray County, added a good well at Continental Oil Co. 1 James, NE NW NE 3-1s-2e.

The well made 60 bbl. of oil in 6 hours on ¼-in. choke from perforations in the Second Bromide sand of Ordovician age. Perforations were at 3,585-96 ft. Gas flow was 10,860 M.c.f.d. with gas-oil ratio at 181:1.

On tests of the Third Bromide sand, the well flowed 258 bbl. per day on 15/64-in. choke from perforations at 3,691-3,708 ft.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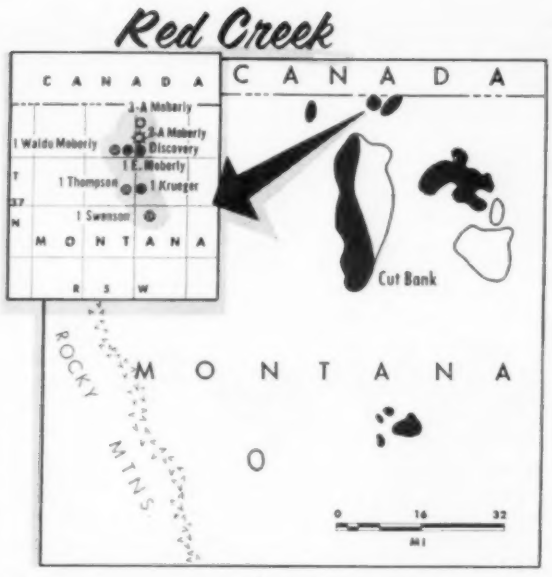
THAT GAVE US A 75 PER CENT REDUCTION IN THE AMOUNT OF GAS REQUIRED TO PRODUCE THE WELL, PLUS A DIRECT SAVINGS IN GAS COMPRESSION COSTS PER BARREL OF OIL PRODUCED. WHAT'S MORE, WE DIDN'T HAVE TO RESPACE THE MANDRELS TO DO IT. YOU SEE, THE TYPE F HAS A RESILIENT MAIN VALVE ELEMENT LIKE THIS IN IT WHICH ACTS AS A VARIABLE ORIFICE. THIS GIVES US CONTROL OF INJECTION GAS AT THE SURFACE. THERE ARE NO CHOKES IN THE VALVE TO RESTRICT GAS FLOW. IN FACT, THE TYPE F HAS AN EXTRA LARGE GAS FLOW PORT AREA TO PASS A MAXIMUM AMOUNT OF GAS AT A MINIMUM PRESSURE, WHEN NECESSARY.
THIS IS HOW THE TYPE F WORKS. THE AREA ABOVE THE SLOTTED PORTS IS THE DOME PRESSURE AREA. PRESSURE IN THE DOME HOLDS THE MAIN VALVE ELEMENT CLOSED ACROSS THE SLOTS IN THE VALVE BODY. THE MAIN VALVE FLEXES TO ADMIT GAS WHEN PRESSURE IN THE ANNULUS EXCEEDS THE SET PRESSURE OF THE VALVE BY AS LITTLE AS ONE OR TWO POUNDS. INCIDENTALLY, BOTH THE DOME AREA AND THE PORT AREA IN THE TYPE F OTIS VALVE ARE EXTRA LARGE.



NORTHWESTERN Montana's Darling area is the scene of a busy Cut Bank and Madison shallow oil and gas play.

Montana's newest hot spot tagged Red Creek

RED CREEK is the name given to northwestern Montana's best new field in some time. The state nomenclature committee tabbed this new Glacier County pool last week.

The fifth well in the field came in last week. Salt Dome Production Co. got both oil and gas on tests of the Cut Bank at 2-A Moberly in NW SW 1-37n-5w, right next to the International Boundary. The well flowed an estimated 5 to 10 M.M.c.f.d. of gas; recovery was 1,270 ft. of oil on tests. The operator is now drilling below 2,672 ft.

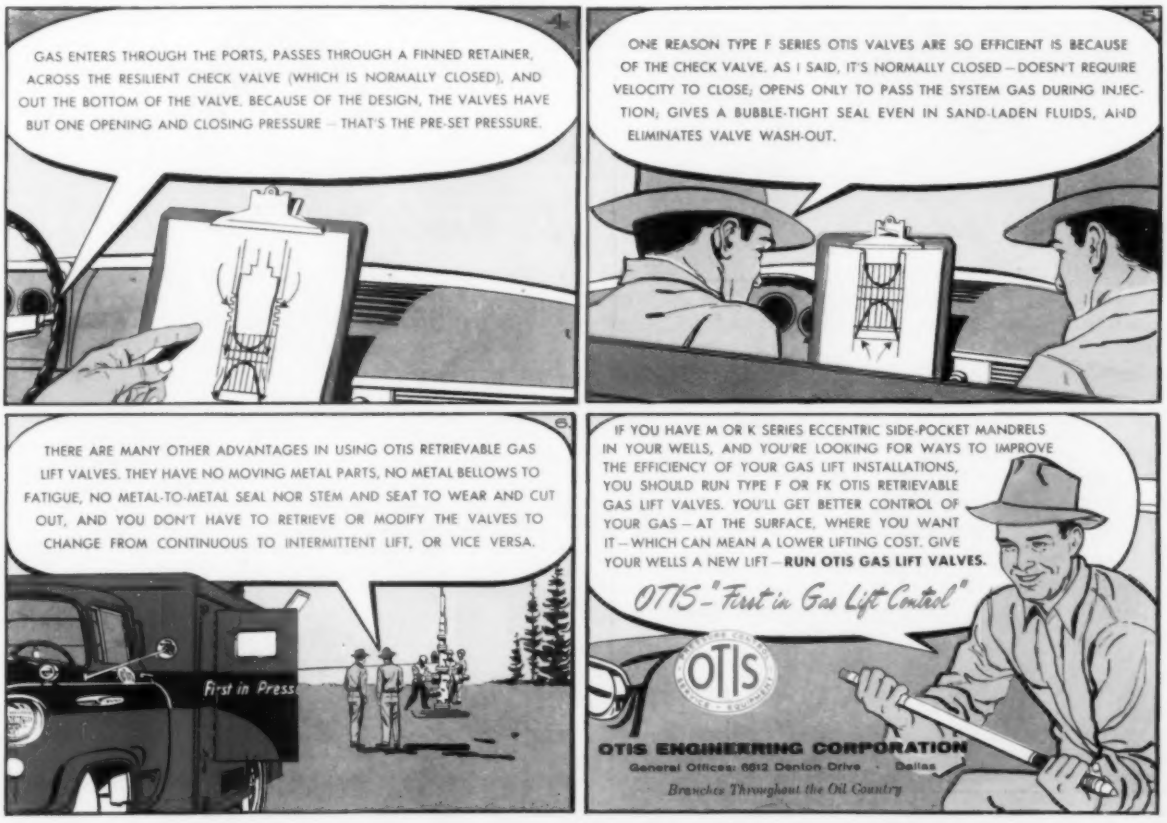
This well is the north offset to the discovery well which made gas in the Cut Bank and oil in the Madison. A west offset to the discovery well, 1 E. Moberly in C SE SE 2-37n-5w, pumped and flowed 190 bbl. of oil daily from the Cut Bank; 125 bbl. per day from Madison. Another step-out test to the west is still under tests.

Two other operators are busy in this new field; Trigood is drilling at a south extension at 1 Swenson in NW NE NW 13-37n-5w. Essex Oil Co. tested Sunburst below 2,600 ft. at the 1 Thompson in NE NE SE 11-37n-5w.

Outlook area gets Devonian play

REMOTE DEVONIAN production was opened in Montana's Outlook area last week. H. L. Hunt 1 Hagen, C NE NW 7-34n-52e, Sheridan County, swabbed 7 bbl. of oil per hour from perforations at 9,392-9,428 ft. in the Winnipegosis.

This field discovery well is 8 miles


4
GAS ENTERS THROUGH THE PORTS, PASSES THROUGH A FINNED RETAINER, ACROSS THE RESILIENT CHECK VALVE (WHICH IS NORMALLY CLOSED), AND OUT THE BOTTOM OF THE VALVE. BECAUSE OF THE DESIGN, THE VALVES HAVE BUT ONE OPENING AND CLOSING PRESSURE — THAT'S THE PRE-SET PRESSURE.
5
ONE REASON TYPE F SERIES OTIS VALVES ARE SO EFFICIENT IS BECAUSE OF THE CHECK VALVE. AS I SAID, IT'S NORMALLY CLOSED — DOESN'T REQUIRE VELOCITY TO CLOSE; OPENS ONLY TO PASS THE SYSTEM GAS DURING INJECTION; GIVES A BUBBLE-TIGHT SEAL EVEN IN SAND-LADEN FLUIDS, AND ELIMINATES VALVE WASH-OUT.
6
THERE ARE MANY OTHER ADVANTAGES IN USING OTIS RETRIEVABLE GAS LIFT VALVES. THEY HAVE NO MOVING METAL PARTS, NO METAL BELLOWS TO FATIGUE, NO METAL-TO-METAL SEAL NOR STEM AND SEAT TO WEAR AND CUT OUT, AND YOU DON'T HAVE TO RETRIEVE OR MODIFY THE VALVES TO CHANGE FROM CONTINUOUS TO INTERMITTENT LIFT, OR VICE VERSA.
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IF YOU HAVE M OR K SERIES ECCENTRIC SIDE-POCKET MANDRELS IN YOUR WELLS, AND YOU'RE LOOKING FOR WAYS TO IMPROVE THE EFFICIENCY OF YOUR GAS LIFT INSTALLATIONS, YOU SHOULD RUN TYPE F OR FK OTIS RETRIEVABLE GAS LIFT VALVES. YOU'LL GET BETTER CONTROL OF YOUR GAS — AT THE SURFACE, WHERE YOU WANT IT — WHICH CAN MEAN A LOWER LIFTING COST. GIVE YOUR WELLS A NEW LIFT — RUN OTIS GAS LIFT VALVES.
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southwest of famous Outlook field, birthplace of pre-Madison oil in this portion of the Williston basin. The 1 Hagen was an old well, having been completed dry by Hunt in 1953 at 9,482 ft.

Weather calls truce for Canada drilling

WESTERN CANADA exploratory success is picking up as weather conditions improve.

During the first 3 weeks of October there were only two discoveries, but last week that rate more than doubled with three apparent hits—two in Alberta, one in British Columbia.

Alberta . . . Barron Kidd and Charter Oil Co., Ltd., found gas in the glauconitic sand at a wildcat in the Sedgewich-Hardisty region, just north of the Bellshill Lake area. The team had been seeking production in the basal Quartz, but during drill-stem test of the glauconitic sand the well flowed 2,480 M.c.f.d.

Canadian Husky Oil, Ltd., and a group headed by Greta Petroleum, Ltd., indicated the second Viking gas discovery near Bruce, 23 miles east of Camrose. This venture was capped as a potential gas producer after making 3,400 M.c.f.d. of gas during drill-stem tests. Another Viking gas discovery drilled by the same team lies 4 miles northeast.

British Columbia . . . The first strike in the northeastern part of this province in many months was recorded by the Pacific Petroleum, Ltd., Imperial Oil, Ltd., and Sunray group at Beatton River. This well is one of the ventures being drilled in this region by the team in an effort to evaluate the trend originally discovered by the Dome-Basco 35-1 Laprise Creek well 10 miles northeast of the new well. The Laprise Creek well was completed for a calculated open-flow potential of 25 M.M.c.f.d. of gas from Triassic earlier this year.

The new well, as well as finding gas in the top portion of the Triassic, uncovered commercial gas production in the bottom, or Triassic "D" zone. Drill-stem test gassed at maximum rate of 1,280 M.c.f.d. Further tests are now under way. The team controls about 298,000 acres around the permit on which the Dome Petroleum Co.'s Laprise Creek strike was made. Three holes are slated for the area.

Cheyenne Valley field jumps south

OKLAHOMA'S Northeast Cheyenne Valley field in Major County jumped one location south at J. M. Huber Corp.'s 2 Sodowsky, C SE NE 5-21n-14w.

After fracturing, the well flowed more than 60 bbl. of oil per hour from the Cherokee - Pennsylvanian sand through perforations at 6,905-38 and 6,958-68 ft. Following recovery of load, the well flowed 61 bbl. per hour for 2 hours on ½-in. choke; the rate increased the third hour to 64 bbl. hourly.

This field was opened earlier this year in a then-barren oil country of the western part of Major County. It is part of the "Woodward trend" that has been developing for the past 2 years and is now in its zenith.

Texas report tells of shut-in gas wells

The Austin Oil & Gas Publishing Co., Austin, has completed a study program of shut-in gas wells in the entire State of Texas and published the findings in two reports.

The data was compiled and pre-

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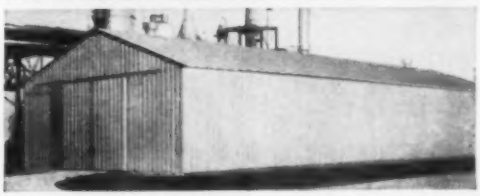

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pared from the records of the Texas Railroad Commission and includes: Railroad Commission district, county, field, operator, lease, well, number, survey, date of completion, perforation interval, formation or reservoir tops, pressures, gravity of gas, and potential test.

The report covering Districts 5, 6, 7B, 7C, 8 and 10 covers approximately 1,000 shut-in gas wells and is complete through June 1, 1958; the report covering Districts 1, 2, 3, and 4, covers approximately 3,000 shut-in gas wells and is complete through December 31, 1957.

For additional information write Box 5146, West Austin Station, Austin.

New pay indicated in Texas' Kingsville

INTEREST is being revived in the old Kingsville area, in Kleberg County, lower Texas coastal region, where a deep exploratory test is giving indications of new production in sands below previously known horizons.

The present deep test is the first drilling in this field in more than a year. It is being put down by Katz Oil Co. Location, 1 Dennett, is off the northeast side of the field.

The most prospective oil zone found so far is at 6,158-65 ft. where a drill-stem test recovered 325 ft. of 41°-gravity oil and 75 ft. of oil-cut mud after registering bottom-hole pressures of 1,755 psi., flowing, and 2,640 psi., shut in.

Two other zones, one at 5,849-58 ft., and the other at 6,463-72 ft., have given indication of gas, and possibly condensate production.

Deepest production so far in the field has been from a 4,700-ft. sand, but above that sand there are numerous zones which have yielded oil or gas. History of the field dates from 1913, making the field one of the oldest in far-south Texas. Currently, only four wells remain.

On Lake Erie

A new gas field on Canadian side . . .

A NEW GAS FIELD on the Canadian side of Lake Erie north of Long Point in Long Point Bay was uncovered by Bluewater Oil & Gas Co., Ltd., a subsidiary of Canadian Export Gas & Oil, Ltd.

Bluewater's 2 Port Rowan was drilled from a platform resting on pilings in 3 ft. of water. Location is about 1 mile from the shore of Big Rice Bay. Drilling began September 12; the well was completed October 25 with an initial open flow of 410 M.c.f.d. with a shut-in pressure of 625 psi. The producer gets 45 cents per M.c.f. in this part of Ontario which generally allows economic operations on wells of 100 M.c.f. open flow.

Gas was found at 1,235 ft. in a white sandstone of the Clinton formation. There appears to be 20 ft. of sand with a thin shale break. Most of the gas is in the Clinton. There might be some gas in the Medina red sand below 1,256 ft. The well was drilled to 1,381 ft., total depth, without finding any salt water. The gas zone contains only dry, sweet gas with no formation water. An energetic drilling program will be undertaken next spring to outline the new field.

and first gas well on American side

A PORTABLE drilling platform has been towed into the Erie harbor for the winter after use by New York State Natural Gas Corp. to complete the first offshore gas well on the American side of Lake Erie.

The well, about ¾ mile from shore near North Springfield, Pa., was completed after fracture to a volume of about 200 M.c.f.d. of gas. The well has been shut in at lake-bottom level until company officials determine what use will be made of the gas. Bottom of the hole itself is 5,098 ft.

The drilling platform will leave Erie harbor next spring for more offshore drilling.

Rich well confirms South Texas field

AN exceptionally rich gas-condensate well is confirming the recent discovery of Wilcox-Slick sand production in the Albrecht area, 10 miles northwest of Goliad, in Goliad County, South Texas.

The new well, D. D. G. Gas & Oil Corp. and Del Mar Drilling Co. 1 Ramsey, is 5,000 ft. northeast of the Slick sand discovery well drilled by Skinner Corp. It is shut in after testing Slick sand perforations at 8,063-68 ft.

Gas volume was not gaged but flowing pressure was 1,650 psi. through ¼-in. choke, and 2,500 psi. through ⅝-in. choke. On final test, the well had 1,000 ft. of free condensate in the hole.

The recently completed Skinner Corp. Slick sand discovery well (1 Coutret, Jr.), is perforated at 8,056-62 ft., where it is rated at 9 M.M.c.f.d. of gas with a gas-liquid ratio of 45 M.c.f. per barrel. It also was completed in the field's previously discovered Wilcox-Machank sand at 8,358-60 ft.

The Ramsey well also tested gas showings in the shallower Reklaw formation and in the Wilcox-Luling zone. Albrecht field, discovered in 1952, also produces from a 4,700-ft. Yegua sand.

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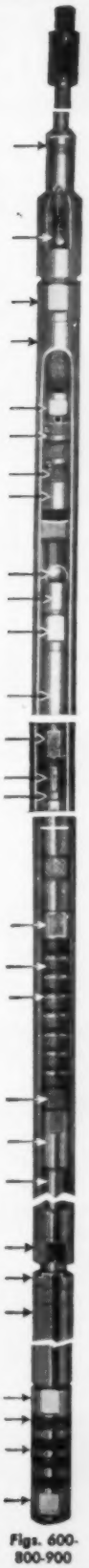

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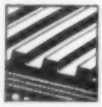

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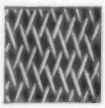

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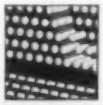

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Dual hit extends West Texas field

SOUTH CENTRAL Andrews County gained a dual producer which extended Ellenburger production ½ mile to the east, and opened the Fusselman section as a new-pay discovery for the area.

The Texas Co. 1 "CR," 10 miles south of Andrews in Section 36, Block 9, University Lands Survey, had a combined daily potential of 739 bbl. of oil a day.

Fusselman potential was 320 bbl. of 45°-gravity oil a day from perforations at 11,683-11,717 ft. Flow was through 18/64-in. choke, under tubing pressure of 800 psi. Gas-oil ratio was 1,452:1.

Ellenburger potential was 419 bbl. of 49°-gravity oil a day through 14/64-in. choke from perforations at 12,490-12,510 ft. Flowing tubing pressure was 725 psi. Gas-oil ratio was 467:1.

Drillers busy in SE New Mexico

WEEK'S DEVELOPMENT in southeastern New Mexico included location for a Devonian wildcat in northern Lea County, plus a number of wildcats showing as possible discoveries.

The new well is A. A. Cameron, Midland, 1-14 Bogle Farms, SE SE 15-11s-34e. Location is 13 miles northeast of Tatum, and 3 miles northwest of Four Lake field. Projected depth is 13,750 ft.

Cameron 1 Bogle Farms, in SE SE 15-11s-34e, was drilling ahead near 10,000 ft. last week. It is also projected to 13,750 ft. Cameron 1-10 Bogle Farms is also a Devonian test, in the location stage, in SE SE 10-11s-34e.

In southern Lea County, Forster Drilling Co. and Cabot Carbon Co. continued testing their 1 Federal as a Seven Rivers discovery prospect. A 16-hour pumping test returned 58 bbl. of new oil from perforations at 4,085-98 ft.

Location in 25-19s-34e is 5 miles southwest of Pearl townsite and about 1 mile northwest of Queen production in Pearl field.

G. E. Halls 1-G State, wildcat in western Chaves County, flowed gas at the rate of slightly better than 1 M.M.c.f.d., with a trace of condensate, on a drill-stem test in the Pennsylvanian at 10,572-10,675 ft.

Operators drilled ahead to 11,753 ft., set casing to 10,640 ft., then perforated at 10,460-72, 10,577-88, and 10,610-20 ft. for further tests.

Location is 4 miles northwest of Caprock townsite and 7 miles northwest of Mescalero field, in 22-10s-31e.

New hunt planned for eastern Pecos

THE SHEFFIELD CHANNEL area of eastern Pecos County, West Texas, gained a deep exploration, plus two shallow Queen sand discoveries last week.

The new explorer is Standard Oil Co. of Texas 1 Fred P. Montgomery. Projected depth is 14,000 ft., which in that area should penetrate the Ellenburger.

Location is 38 miles southeast of Fort Stockton in NW SE Section 33, Block 127, T&STL Survey. It is 5 miles southeast of Hokit field, opened by Standard of Texas in 1957 as a Pennsylvanian discovery, and 5½ miles west of a 13,991-ft. dry hole. The Hokit discovery was drilled to 11,506 ft., entering the Ellenburger at 11,166 ft. on ground elevation of 3,255 ft. Completion at Hokit was in a detrital section at 9,428-46 ft.

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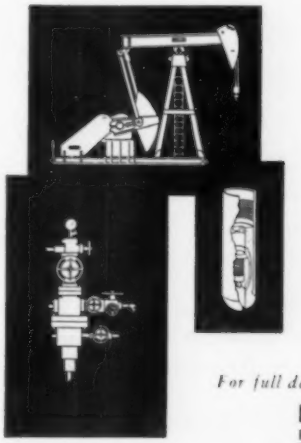

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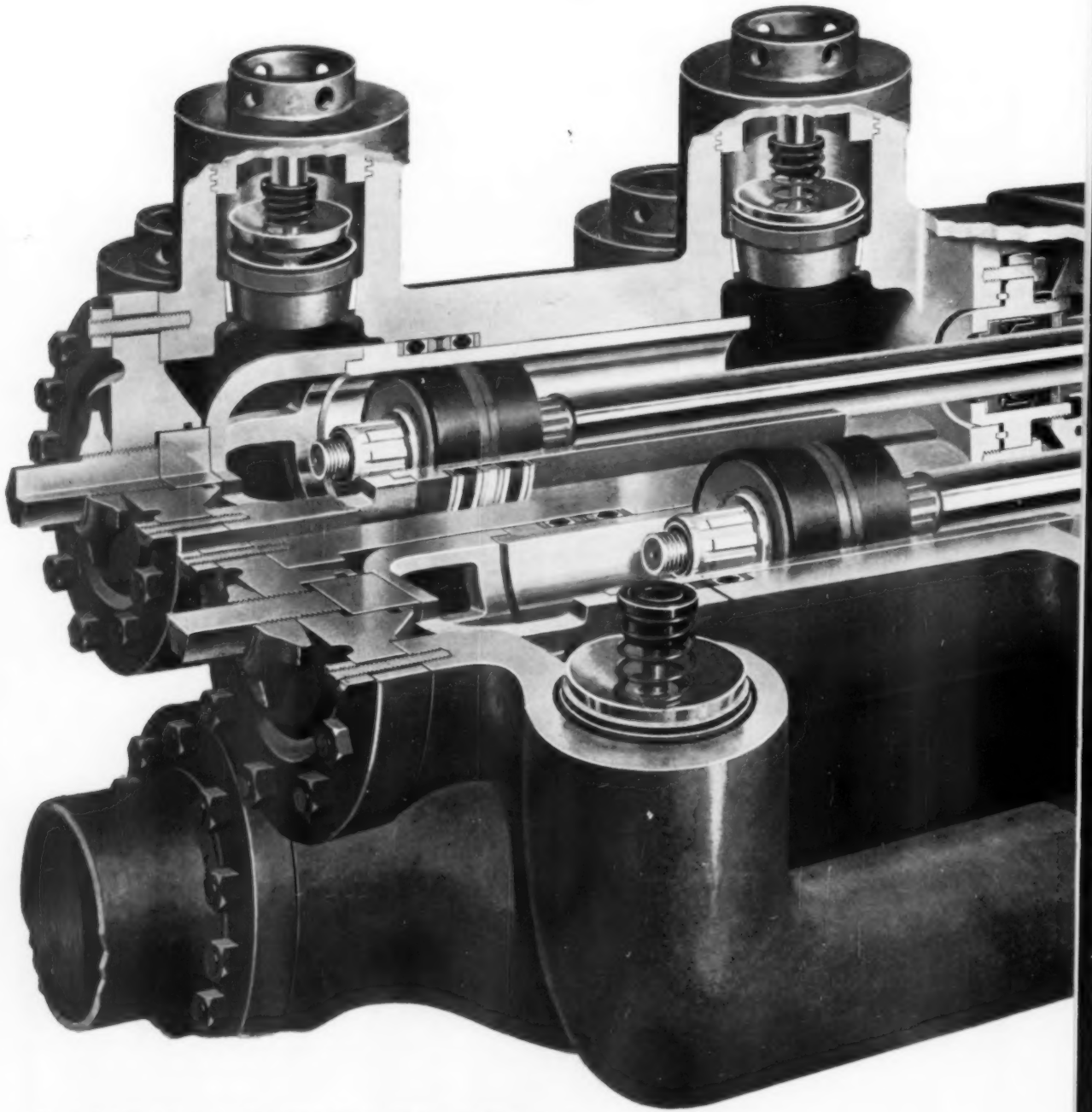

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Both liner and pump bore depend upon the liner packing for freedom from fluid cutting. *MISSION SUPER-SERVICE® LINER PACKING* features exclusive "zero clearance" confinement of packing rings that multiply packing life many times.

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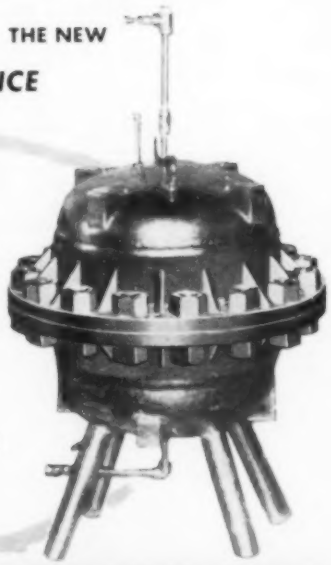

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try is located on a 640-acre lease.

Queen discovery . . . Robert Donnell and Bell & Dansfield 1 Frank A. Perry has been completed as a pumping discovery from the Queen sand, for 122 bbl. of oil a day.

Location is in eastern Pecos County, about a mile southeast of production in Priest & Beavers field. Perforations in the Queen at 2,210-14, 2,282-88, 2,294-98, 2,302-06, and 2,210-14 ft. were acidized with 1,000 gal. and then fractured with 10,000 gal. The well is in Section 16, Block C-4, GC&SF Survey.

Pecos County's second Queen discovery was a high-potential well. Curtis R. Inman, Dallas, 1 J. L. Nutt, located 20 miles southeast of Bakersfield, rated a daily flowing potential of 541 bbl. of 26°-gravity oil a day, based on a 7-hour flow test which tanked 157 bbl. of oil. Pay was an open-hole section between 2,380-2,470 ft. Choke size was not reported.

The well is in Section 5, Block 180½, TCRR Survey, 7 miles north of Puckett field.

Discovery testing . . . Northwest of Puckett field, Phillips Petroleum Co. continued production tests from the Wolfcamp at its 1-A Harral. The well flowed gas at the rate of 2,387 M.c.f.d. through ¾-in. choke, plus 9 bbl. of water an hour. Perforations being tested were at 15,654-15,790 ft. Total depth was 19,020 ft., plugged back to 15,884 ft. Location is in Section 6, Block 126, T&STL Survey.

Dual well expands Texas Coast field

A NEWLY COMPLETED dual-zone well in the North Appling field, northwest of Carancahua, in Calhoun County, Texas' central coastal area, is the field's first oil producer in one of its sands, and the fourth in the other.

The well is Layton Brown's 3 Katherine Maude Sells. Its upper zone, perforated at 7,683-87 ft., is the field's Sells sand, previously a rich gas-condensate reservoir. As this sand's oil-discovery well, it flowed at the rate of 207 bbl. per day through 7/64-in. choke.

Flowing pressure was 1,160 psi., and gas-oil ratio 589 cu. ft. per bbl. Gravity of the oil was 42.7°.

The other zone is the field's Melbourne sand, perforated at 8,562-66 ft. Flow from this was 103 bbl. of 43.7°-gravity oil per day through 7/64-in. choke. Pressure was 1,875 psi., and gas-oil ratio 1,291 cu. ft. per bbl.

Deep test set for West Central Texas

AN ELLENBURGER TEST approximately ½ mile southeast of Cook sand production in Burch field, extreme southwestern Throckmorton County, has been set by Clark & Cowden, Dallas operators.

The firm's 1 T. G. Hendrick Trust estate has been located in Section 11, Brooks & Burleson Survey M-5. Projected depth is 4,900 ft.

Directly to the west, in Haskell County, location has been made for a 6,000-ft. Ellenburger exploration. This well is Oil & Gas Investments Corp. 1 Ida Reese. Location is in Section 47, Block 2, D&W Survey. The proposed wildcat is 2 miles southeast of Knox City and 2½ miles north of East O'Brien Strawn field.

Comanche prospect . . . Humble Oil & Refining Co. 1 J. A. Mercer, 4½ miles west of Gustine townsite and about 15 miles east of nearest production, reported shows of oil in the Ellenburger.

A drill-stem test at 3,560-82 ft. had gas in 54 minutes and recovered 125 ft. of oil and gas-cut mud, plus a small amount of free oil. Other tests recovered gas-cut mud at 3,581-3,612 ft., at 3,612-56 ft., and at 3,656-3,706 ft. Mud with no shows was returned at 3,706-82 ft. Top of the Ellenburger was picked at 3,515 ft.

Successful wildcats

ARKANSAS

Conway County: John M. Beard 1 Bertha Barrett, NE SW NE 22-8n-17w. IP 5,708 M.c.f.d., Barton "A" 2,668-82 ft., lower Barton 2,875-91 ft. TD 2,896 ft. New pool.

Crawford County: G. C. Parker and J. A. Chapman 1 Meyers, NW¼ 9-8n-31w. IP 1,400 M.c.f.d., Atoka sand 5,305-5,438 ft. TD 6,478 ft. New gas pool.

Lafayette County: Janlyn Oil Co. 1 J. A. Smith, C SW NW 1-17s-23w. IP 35 BOPD, 65°, Smackover 8,230-45 ft. TD 8,282 ft. Opens Northeast McKamie pool.

Franklin County: Arkansas-Western Gas Co. 1 Clem Atkerson, NE SE NE 36-10-28w. IP 12,900 M.c.f.d., Atoka (Dunn) 3,160-90 ft., Hale 4,114-44 ft. TD 4,474 ft. New Hale discovery.

CALIFORNIA

San Joaquin County: Porter Sesnon et al., 33-22 Sesnon-Giambastiani, 10 M.M.c.f.d., perfs. 4,059-60 ft. TD 4,144 ft. New pool discovery in Vernalis gas field.

WESTERN CANADA

Alberta: Mobil Oil 6-11-33-26 South Wimborne, LSD 6, 11-33-26w4. D3 oil discovery. TD 7,570 ft.

Husky et al., 7-10-47-16 Bruce, LSD 7, 10-47-16w4. Viking gas discovery. TD 2,790 ft.

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The Charles Wheatley Company, Tulsa, recently conducted a flange failure test at its Caney, Kansas plant to demonstrate the features of Wheatley "O" Ring seals versus conventional seals. The test was conducted under the supervision of the United States Testing Laboratory using a 20" "O" Ring cast carbon steel flange and a 20" conventional forged steel flange.

Final failure pressures were 2650 psig on the conventional flange and 3000 psig on the "O" Ring. The new, lightweight high-performance "O" Ring Flange is the result of Charles Wheatley's continuing efforts to provide you with the best valves and accessory equipment in the industry. Contact the Charles Wheatley Company before specifying valves on your next job.

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TULSA 20, OKLAHOMA

British Columbia: Texaco-NFA 9 Nig Creek, Unit 7, Zone B NTS Map 94-H-4. Triassic gas discovery. TD 4,562 ft.

Saskatchewan: Pope 5-8-11-26 South Scallion, LSD 5, 8-11-26w1. Mississippian oil discovery. TD 2,080 ft.

COLORADO

LaPlata County: W. E. Bakke-Moody Properties 1-X Ute, 14-32n-7w. IP 1,835 M.c.f.d., Mesaverde discovery. TD 7,920 ft.

Moffat County: The Texas Co. 1 A. P. Orie et al., 13-5n-96w. IP 121 BOPD, 4 BWPD, 33°, Morrison 5,071-73 ft., 5,075-77 ft., 5,095-5,105 ft. TD 5,340 ft. New pay discovery at North Denforth Hills pool.

Morgan County: H. L. M. Drilling Co. 1 Snodgrass, C NW NW 15-3n-58w. IP 92 BOPD, "D" sand 5,691½-94½ ft. TD 5,825 ft. Discovery.

ILLINOIS

Coles County: Parrish & Ensminger 1 Paul McDevitt, SE SE NE 1-12n-10e. IP 5 BOPD, Penn. 410-57 ft. TD 461 ft. Extension to South Ashmore pool.

Gallatin County: Carter Oil Co. 2 D. M. Jones, NW SW SW 4-8s-8e. IP 204 BOPD, 2 BWPD, Rosiclare 2,722-30 ft. TD 2,764 ft. New pay discovery.

Hamilton County: Indiana Farm Bureau, Inc. 1 Stewart, SE NW SE 32-5s-7e. IP 15 BOPD, McClosky 3,192-3,202 ft. TD 3,218 ft. Extension to Dale Consolidated field.

Saline County: C. E. Brehm 1 Burnett-Johnson, NW NW NW 21-7s-5e. IP 69 BOPD, 25 BWPD, Aux Vases 3,218-32 ft. TD 3,439 ft. Extension to Dale Consolidated field.

Indiana Farm Bureau, Inc. 1 Alda Edwards, et al., NW SW SE 17-8s-5e. IP 12 BOPD, 90 BWPD, Aux Vases 2,918-36 ft. TD 3,163 ft. Extension to Harco Consolidated field.

Wayne County: Farrar Drilling Co. 1 Hidinger, NW NE NW 20-1s-9e. IP 178 BOPD, McClosky 3,286-93 ft. TD 3,293 ft. Extension to South Locust Grove pool.

Miskell & Skiles Oil Co. 1 C. R. Cunningham, SW SW NW 17-2s-7e. IP 10 BOPD, McClosky 3,393-3,405 ft. TD 3,442 ft. Extension to Consolidated pool.

INDIANA

Pike County: Henry Neely 1 Duke Community, SW SE NW 25-1s-9w. IP 7 BOPD, Rumble 902-12 ft. TD 916 ft. Extension discovery.

Posey County: R. W. Kuzmich 1 Ella Pisely, SE NW 8-4s-13w. IP 22 BOPD, Clore 1,831-42 ft. TD 1,935 ft. Extension to Mumford pool.

Spencer County: Clay Herrell and Cox Drilling Co. 1 Anna Collingnon, NE NE NE 8-5s-4w. IP 64 BOPD, Jackson 646-57 ft., 636-46 ft. TD 657 ft. Discovery of West Fulder pool.

C. W. Lee 1 Frank Hargis-Winkler, SW NW SW 7-7s-5w. IP 24 BOPD, Aux Vases 1,268-79 ft. TD 1,279 ft. Discovery of East Rockfort pool.

KANSAS

Barber County: Aylward and Sunray Mid-Continent Oil Co. 1 Palmer, NE NE NE 30-32s-13w. IP 259 BOPD, 26°, Marmaton 4,477-79 ft., 4,481-90 ft. TD 5,085 ft. Opens Palmer pool.

Haskell County: Northern Natural Gas Producing Co. 1 Sprunger "B," C SE SW 21-28s-34w. IP 196 BOPD, Lansing 4,511-16 ft., Cherokee 5,024-32 ft. TD 5,575 ft. New pay in Eubank field.

KENTUCKY

Muchlenberg County: Creek Oil Co. 1 W. W. Matheny, 5-I-28. IP 85 BOPD, Bethel 1,909-20 ft. TD 1,934 ft. New pay for New Cypress pool.

Hanley & Bird 1 Jess Danner, 16-I-28. IP 2,974 M.c.f.d., Benoist 1,726-35 ft. TD 1,735 ft. Northwest extension to Spawn West field.

NORTH LOUISIANA

Rapides Parish: A. J. Hodges Industries et al. 1 Wm. J. Nesbitt, SEc 33-6n-3e. IP 200 BOPD, 43°, Wilcox 4,095-97 ft. TD 5,567 ft. New pool.

Sabine Parish: Shell Oil Co. 1 Louisiana Long Leaf Lumber Co., SWc 18-6n-12w. IP 134 BOPD, 42.7°, Chalk 2,840-2,900 ft. TD 7,980 ft. Discovery tentatively named Pendleton pool.

Webster Parish: Carter Oil Co. 1 T. S. Sale et al., C SE NW NW 11-23n-9w. IP 98 BOPD, 37.1°, Tokio 3,108-12 ft. TD 3,225 ft. East Redrock discovery.

SOUTH LOUISIANA

Allen Parish: Lamar Hunt et al., 1 Quatre, 27-5s-5w, 2 miles southwest of Pilgrim Church field. IP 175 BOPD and 1,245 M.c.f.d., 5/32-in., 53.8°, TP 3,250 psi., perf. 9,446-60 ft. TD 10,000 ft. New pay and extension in unnamed new field.

Iberia Parish: Union Oil Co. of California 1 Spiller et al., 32-12s-11e. IP 120 BOPD, 2% b.s. and w., 5 M.M.c.f.d., ¼-in., 47.3°, TP 4,050 psi., perf. 11,580-88 ft. TD 13,240 ft. New pay in Big Pigeon field.

Plaquemines Parish: J. W. Mecom, Freeport Oil Co., and J. E. Hill 1-Q BLD-LL&E-R. Price et al.-State Lease 2345. IP 219 BOPD and 411 M.c.f.d., 5/64-in., 39.8°, TP 8,300 psi., perf. 13,891-13,916 ft. TD 13,930 ft. Discovery well Diamond field.

MICHIGAN

Monroe County: Lowell Bernhardt 1 Kain, NE NW NW 30-7s-6e, Summerfield Township, 4 miles south Deerfield pool. IP 12-15 BOPD, Trenton 1,950-62 ft. TD 2,382 ft. New oil discovery.

Washtenaw County: George Hanners 1 Boyce, SW NE NE 7-1s-3e. Lyndon Township, 15 miles southwest Howell gas pool. IP 250 cu. ft. of gas per day in Traverse after plugback. Traverse gas pay 1,314-40 ft. TD 4,702 ft. PBTD 1,560 ft. New gas pool.

NEBRASKA

Banner County: McDaniel Drilling Co. 1 Engstrom, C SW SW 35-17n-53w. IP 130 BOPD, 40% basic sediment and water, "J" sand 5,661-68 ft. TD 5,684 ft. New pool.

NORTH DAKOTA

McKenzie County: Calvert Drilling Co. 1 M. Signalness, C SW NW 2-150n-96w. IP 48 BOPD, 48 BWPD, 40°. TD 9,600 ft.

OHIO

Coshocton County: National Associated Petroleum Co. 1 F. Gilmore, Sec. 7, Bedford Twp. IP 40 BOPD, Clinton 3,474-86 ft. TD 3,577 ft.

Holmes County: Baldwin Realty Co. 1 Z. V. Raber, Sec. 22, Mechanic Twp. IPP 50 BOPD, Clinton 3,815-50 ft. TD 3,982 ft. New oil pool.

OKLAHOMA

Alfalfa County: Woods Petroleum Co. 1 Cloyd, C NW SE 26-28n-11w. IP 480 BOPD, 40°, Cherokee 5,033-38, 5,027½-28½ ft. TD 5,119 ft. Discovery southwest of South Amorita pool.

Beaver County: Republic Natural Gas Co. 2 J. R. Woodson, NE¼ 18-2n-27eCM. IP 1,636 M.c.f.d. Tonkawa 5,679-85 ft., 5,688-96 ft. TD 8,170 ft. New gas field.

Panhandle Eastern Pipe Line Co. 1-27 Girk, C SE NW 27-6n-24eCM. IP 4,125 M.c.f.d.; 84 BOPD, Marmaton 5,486-91 ft.; Morrow 6,195-6,202 ft. TD 6,400 ft. New pay in Mocane gas area.

Cleveland County: Continental Oil Co. 1 Meye, NW NW 22-9n-3w. IP 80 BOPD, 50 BWPD, 36.8°, Second Wilcox 9,561-9,607 ft. TD 10,500 ft.

Comanche County: Kingwood Oil Co. 1 Talley heirs, C SE SW 26-3n-9w. IP 4,640 M.c.f.d. Briscoe 7,595-7,608½ ft. TD 8,510 ft.

EAST TEXAS

Anderson County: W. D. McBee et al. 1 Adam Cone, A. M. Lewis Sur., Acosta Grant, 2 miles southeast of Bethel. IP 4,600 M.c.f.d. plus 173 BC per M.M.c.f., 53.4°, GOR 5800:1, COF, Rodessa 9,793-9,839 ft. TD 9,880 ft., elev. 364 ft. Opens East Bethel field.

Franklin County: F. R. Jackson and S. H. Killingsworth 1 Parchman-Moore, George Richardson Sur., A-402, 1½ miles southeast of Mt. Vernon. IPP 178 BOPD, 38°, GOR 175:1, Pettet 7,003-09 ft. TD 7,063 ft., elev. 470 ft. Opens Mt. Vernon, West.

Rusk County: F. R. Jackson 1 S. N. Pincham, Joseph English Sur., A-265, 8 miles east Mt. Enterprise. IP 52 BOPD, ¼-in., TP 200 psi., 42°, GOR 576:1, Rodessa 6,056-64 ft. TD 7,195 ft., elev. 437 ft. New pay in Caledonia field.

SOUTHWEST TEXAS

Duval County: G. L. Rowsey 2-B Archer Parr, Jr., Sur. 13, 6 miles west of San Diego. AOF 620 M.c.f.d., GLR 20.7 M.c.f. per bbl., 52.1°, shut-in TP 2,305 psi., perf. 6,395-6,402 ft. and 6,420-26 ft. TD 6,602 ft. New pay in Cadena field.

Wilson County: Frank O. Cox, Sr., 1-P D. S. Alley estate, J. H. San Miguel Sur., A-291, 5 miles northeast of Sutherland Springs. IPP 18.2 BOPD net, 50% water, 21°, open hole 1,919-20 ft., Midway-Poth sand. TD 1,920 ft. New pay in Kaye field.

TEXAS GULF COAST

Chambers County: Earl T. Mackey 1 Jackson, S. Mather Sur. 16, A-195, 17 miles south of Anahauc. AOF 8,500 M.c.f.d., GLR 80 M.c.f. per bbl., 61°, shut-in TP 695 psi., perf. 8,844-49 ft., Frio. TD 9,431 ft. New pay and extension in East Mayes area. This is former dry hole drilled by Phillips Petroleum Co. as 1-A Ocie in 1956.

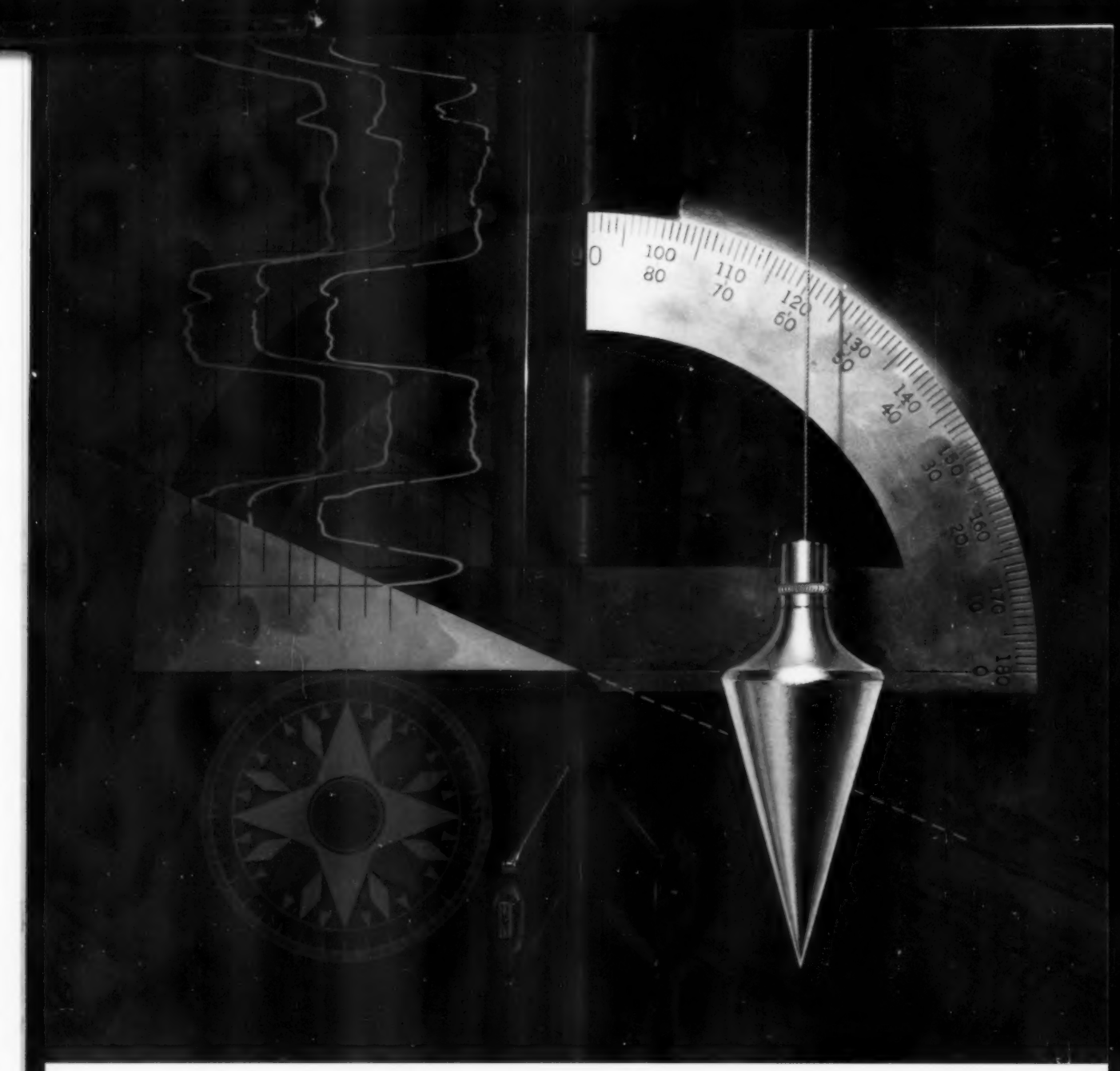
Victoria County: Harkins & Co. et al., 1 J. Allen Kyle, Felipe Dimmit Sur., A-20, 2½ miles west of Nursery. AOF 2 M.M.c.f.d., GLR 40 M.c.f. per bbl., 56°, shut-in TP 3,934 psi., perf. 9,510-16 ft., Wilcox. TD 9,523 ft. New-field discovery well.

WEST CENTRAL TEXAS

Jones County: Youngblood & Youngblood 1 Hollis Manly, 41-14-T&P, 6 miles north Hamby. IP 52 BOPD, 8/64-in., 37°, GOR 250:1, TP 100 psi., Tannehill 1,642-46 ft. TD 1,710 ft., elev. 1,686 ft.

WYOMING

Crook County: Petroleum, Inc. 1 Butler, 22-49n-68w. IP 15 BOPD, Muddy 5,914-22 ft. TD 6,345 ft. Discovery of Butler Ranch field.



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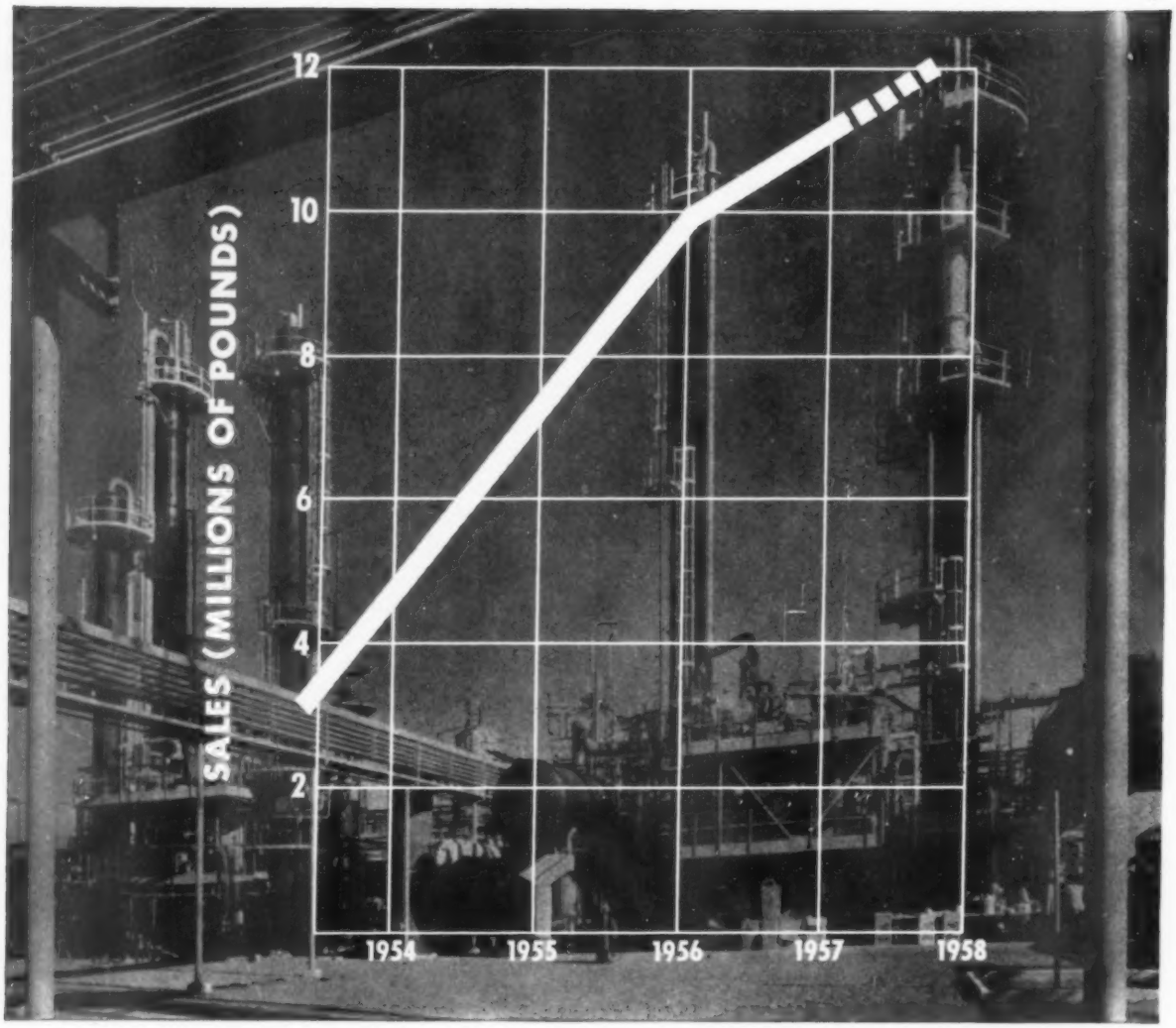

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Warren Is Back in Oil

. . . as a top executive in the Cities Service organization. He has a solid background in oil, government, banking.

J. ED. WARREN, who considers himself more of an oil man than a banker, regards his return to the oil industry as a challenge.

Warren took over November 1 as chairman of the executive committee and member of the board of directors of Cities Service Co. He had been out of the operating end of the oil business the last 5 years while serving as vice president in charge of the petroleum department of First National City Bank of New York.

Warren's background and experience have prepared him to meet the challenge of his new position. He sees the immediate future of oil as "complex and competitive"—but he isn't dismayed. He's confident both aspects will soften in time, largely because of the expanding economy.

He realizes the challenge extends well beyond the immediate problems of the industry, for he's aware of oil's position and responsibility in the national economy. In his new post he exerts a strong influence on policies of a major company that has a major role in the welfare and economy of the country.

The value of oil shares represents about 20% of the total value of stocks traded on the New York Stock Exchange. Twenty of the 100 leading corporations in the nation are oil companies. These facts, Warren says, illustrate the importance of oil, and they help explain why it is the prime target of proponents of regulation.

Background . . . Warren not only has broad experience in oil operations and banking, but also in governmental and trade association affairs.

Born June 9, 1900, in Seattle, Wash., he attended public schools in Bremerton, Wash. After interrupting his education for a year while serving in the Navy during World War I, Warren entered the University of Washington. He obtained a bachelor of science degree in geology in 1923.

Warren then embarked on an oil career which has led to his present high position. His first job was with Carter Oil Co. in Salt Creek, Wyo.

His sense of humor was demonstrated years later when he recalled that first job: ". . . I was handed a shovel and assigned the task of cleaning out the camp septic tanks and cesspools. This chore conditioned me sufficiently so that I was acceptable to the regular roustabout gang."

J. Ed. Warren

In 1925, Warren received an appointment as junior petroleum engineer with the U. S. Bureau of Mines in Denver, Colo. He left the Bureau of Mines in February 1926 to accept a position as geological scout with Marland Oil Co. of Albuquerque, N. M. A short time later he was transferred to the Marland Oil Co. of Texas as a petroleum engineer with headquarters in Borger. Then he became assistant district superintendent of production. He held that job, in the Panhandle and West Texas, with Marland and its successor, Continental Oil Co., until 1934.

Warren then joined Carl B. King Drilling Co. of Midland, Tex. He became president in 1943 and continued to head the firm until it was sold in 1952. The Permian basin was contractors' country and Warren was right in the middle of many new drilling developments.

With a top-drawer team, the Carl B. King company took the lead in a number of sound innovations which contributed to higher penetration rates, lower costs and, greater safety. To name a few, they had a hand in operating-cost studies, improved drilling records, time analyses, unitized rig design, reverse circulation, drill-stem corrosion control, and the time-saving method of skidding derricks on wheels. The firm, and Warren, became nationally known for its progressive engineering approach to drilling problems.

Recognition came rapidly. Warren was elected AAODC president in 1947. Then, as a partner in King, Warren & Dye, independent producers, he took an active part in IPAA and was named to head the organization for 1949-50. He participates as a director in the API and the Mid-Continent Oil and Gas Association and retains his honorary directorship in AAODC.

In 1952 he was called to Washington to serve as deputy administrator in PAD. From this stemmed an appointment as consultant to ODM Director Flemming and Interior Secretary Seaton during the Suez crisis in 1956.

Public relations minded . . . Warren realizes the importance of public relations to the oil industry.

He was chairman of the Oil Industry Information Committee for Texas and New Mexico in 1947 and 1948. He was a member of the Policy, Practices, and Procedures Committee of the API that recommended the merger of OIC and APIC. He is confident the merger will increase the effectiveness of oil's public relations.

●

Harold G. Mangelsdorf, deputy world-wide refining coordinator for Standard Oil Co. (N. J.), has been elected a director of Esso Export Corp.

William C. Woerner, Magnolia Petroleum Co., has been elected chairman of the Dallas-Fort Worth chapter of American Society of Lubrication Engineers.

W. M. Cocke, assistant manager of Cit-Con Oil Corp.'s Lake Charles, La., refinery, has been named manager of operations. He succeeds **Lee N. Haugen,** who was recently named vice president, general manager, and a director of Cities Service Research & Development Co. Cocke joined Cit-Con as general superintendent in 1947.

Henry P. Hellinghausen, manager of Interstate Oil Pipe Line Co.'s material-traffic department, has retired. Hellinghausen was a director of the old Oklahoma Pipe Line Co. before it was merged with Interstate. **F. Roy Ball,** assistant manager of the material-traffic department, has moved up to manager to succeed Hellinghausen. **Robert B. Giezentanner** has been named assistant manager replacing Ball.

▶ ▶ ▶ Personals

Dwight B. Sprow, executive vice president of Houston Texas Gas & Oil Corp. and Coastal Transmission Corp., has been elected a director of both companies. **G. B. Bennett,** Houston Texas Gas & Oil vice president, has been elected a director of that company. Bennett is also a vice president of Houston Corp., parent company of Coastal and Houston Texas Gas & Oil. Sprow was vice president and operating superintendent of Natural Gas Pipeline Co. of America and Texas-Illinois Natural Gas Pipeline Co. before joining the two Houston Corp. subsidiaries a few months ago. Bennett was southwest production division gas superintendent for Sun Oil Co. before joining Houston Corp. recently.

SPROW

BENNETT

Howard G. Johnson has been named vice president and general manager of Hunter Drilling, Ltd., Calgary. He succeeds the late Jack Hunter. **Reginald Stevens** has been appointed drilling superintendent of the company succeeding the late F. M. Valint.

S. B. Crooks, consultant for light products in Cities Service Oil Co.'s supply and distribution department, has retired after 45 years with the company and its affiliates. Crooks served at one time as assistant superintendent of gas pipelines, general superintendent of gasoline plants, and superintendent of sales and traffic for the natural gasoline and chemical divisions.

John E. Wood, III, general manager of Esso Standard Oil Co.'s chemical products department, has been named president of Enjay Co., Inc. He succeeds **O. V. Tracy,** who will continue as a vice president and director of Esso Standard. New Enjay vice presidents are **Karl J. Nelson,** head of the sales department; **Harold J. Rose,** manager of products management; and **A. Donald Green,** head of the new projects department.

Carl E. Youngren, formerly with Fargo Oils, Ltd., has joined Lion Oil division of Monsanto Chemical Co. in the Calgary production and exploration department.

Bruce J. Edmonds, Crown Central Petroleum Corp.'s district superintendent in Palacios, Tex., has been promoted to chief petroleum engineer for the company. He will headquarter in Houston.

G. L. MacNutt, superintendent of the process department at the Aruba, Netherlands Antilles, refinery of Lago Oil & Transport Co., Ltd., has been named mechanical superintendent there. **H. Chippendale,** formerly on special assignment, will succeed MacNutt.

Joseph H. Lang, manager of Ohio Fuel Gas Co.'s transmission department, has been elected a vice president. Lang was general superintendent of pipelines before becoming assistant manager of transmission in 1951. He moved up to manager of transmission last month.

R. D. Patch has been named regional coordinator for refining, Eastern Hemisphere, for Standard Oil Co. (N. J.) He succeeds **Brian Mead,** who will retire January 1. Patch was formerly head of the petroleum products division at Esso Standard Oil Co.'s Baton Rouge, La., refinery. More recently, he has been on assignment with Esso, A.G., German affiliate company.

G. C. Briggs, assistant general sales manager, retail, for Standard Oil Co. of California, Western Operations, Inc., has been named general sales manager, retail. He succeeds **E. D. Thompson,** who has retired after 42 years with the company. **W. B. Wright,** regional sales manager for The California Co., subsidiary of California Standard, will succeed Briggs.

E. H. Tollefson, executive vice president of Consolidated Natural Gas Co., has been elected chairman of the board of the Institute of Gas Technology, affiliate of Illinois Institute of Technology. Newly elected trustees of the Institute include **Lester T. Potter,** Lone Star Gas Co.; **Charles M. Sturkey,** Washington Natural Gas Co., Seattle; **Milton J. Pfeiffer,** Cincinnati Gas & Electric Co.; **Linn Bowman,** Rochester Gas & Electric Corp., Rochester, N. Y.; **F. S. Cornell,** A. O. Smith Corp.; and **R. J. Rutherford,** Worcester Gas Light Co., Worcester, Mass.

Gene F. Daniel, petroleum engineer with Tennessee Gas Transmission Co., has been transferred to Shreveport, La., from Hobbs, N.M.

William H. Carter has been named district geologist and head of Cooperative Refinery Association's new Midland, Tex., office.

H. M. Wilson, Jr., senior petroleum engineer with Humble Oil & Refining Co., has been transferred to New Orleans from Paradis, La.

Harold K. Apel, manager of the product pricing department for Standard Oil Co. (Ind.) in Chicago, has retired after 44 years with the company. He will be succeeded by **William C. Marquis.**

Warren Wilson, assistant to the manager of Esso Standard Oil Co.'s Bayway refinery, Linden, N. J., has been transferred to New York as manager of additives in the chemical-products department. Wilson joined Esso in 1933 at Bayway.

R. C. Adam will become manager of economics for Magnolia Petroleum Co. January 1. Adam will move to Dallas from Beaumont, Tex., where he is manager of operations at Magnolia's refinery. A graduate of the University of Arkansas, Adam joined Magnolia in 1946. He has been operations manager in Beaumont since 1956.

Harry L. Moir, Pure Oil Co.'s assistant vice president for retail marketing, has been named vice president in charge of retail marketing. He succeeds **Lisle W. Sweet,** who has been named vice president in charge of marketing. **Allen C. Hutcheson,** secretary, and **Raynor F. Sturgis, Jr.,** treasurer, have been elected vice presidents.

Dudley L. Rankin, manager of Wyco Pipeline Co., will be in charge of construction and inspection of products pipelines in European countries participating in the North American Treaty Organization. Rankin's 18-month assignment in Paris is sponsored by the State Department. Rankin is a veteran employe of Standard Oil Co. (Ind.). Wyco Pipeline is owned by Indiana Standard, The Texas Co., and Socony Mobil Oil Co.

James C. Donnell, II, president of Ohio Oil Co., has received an honorary degree of Doctor of Humane Letters from Defiance College, Defiance, Ohio. Donnell was cited for his "concern for the advancement of his community and state and nation in all the circumstances of human living." A graduate of Princeton University, Donnell has been president of Ohio Oil since 1948.

T. G. Wunderlich, junior mechanical engineer in Houston for Shell Oil Co., has been promoted to mechanical engineer and transferred to Corpus Christi, Tex.

Haylett O'Neill, assistant purchasing agent for Humble Oil & Refining Co., has been named purchasing agent. He succeeds **Francis T. Fendley,** who has retired after 39 years with the company.

Clifford R. Walker, former president of Merrill Petroleums, Ltd., has been named president of Kroy Oils, Ltd. New Kroy directors are **John A. Scrymgeour,** former executive vice president of Home Oil Co., Ltd., and now an independent operator; **William Knode,** who recently retired as general manager of Alberta Gas Trunk Line Co., and **H. Richard Whittall,** Vancouver investment broker.

John M. Taylor has been named manager of Canadian Pacific Oil & Gas, Ltd., exploration subsidiary of Canadian Pacific Railway Co. He will headquarter in Calgary.

Richard E. Johnston, Gulf Coast division engineer for Sohio Petroleum Co., has been named district superintendent of production in Lafayette, La. He succeeds **Louis Records,** who has resigned.

Joe A. Keepers has been named manager of petrochemical sales for Lion Oil Co. division of Monsanto Chemical Co. Keepers has been senior project specialist in Lion's New Orleans development department for the past year. He will headquarter in Houston.

John S. Kelly, formerly chief geologist for Cosden Petroleum Corp., has opened consulting offices in Big Spring, Tex. Kelly entered the oil business in 1925. He was with Tidewater Oil Co., Ohio Oil Co., and American Republics Corp. before joining Cosden in 1951.

J. Moffat has been named deputy general manager of refinery operations by British Petroleum Co., Ltd., with responsibility for manufacturing and planning. **Dr. T. Tait** has been appointed manager, refineries division and production control. **J. W. Hyde** has been named assistant coordinator for research, and **W. J. Newby** becomes assistant coordinator for development.

▶ ▶ ▶ Personals

David P. Martin, group process supervisor at Cities Service Co.'s East Chicago, Ind., refinery, has moved up to chief engineer. He succeeds **Walter V. Kaun,** who has retired. **D. J. Stover** will succeed Martin as group proc-

MARTIN

STOVER

ess supervisor. Kaun had been chief engineer at the refinery since 1930. Martin has been with the company at East Chicago since 1942. Stover joined Cities Service in 1937.

J. E. Renaud, former district geologist with Forest Oil Corp. in southern and central Alberta, has opened consulting offices in Calgary.

A. V. Kane, petroleum engineer in Taft, Calif., with Standard Oil Co. of California, has been transferred to Coalinga, Calif., as development engineer.

Dr. Robert D. Huntoon, associate director for physics for the National Bureau of Standards, has been named deputy director, a new position.

▶ ▶ ▶ Deaths

Fred M. Manning, Sr., 63, drilling contractor with interests in Oklahoma, Wyoming, Colorado, and California before his retirement in 1950, died October 31 in a Los Angeles hospital. Manning moved to Rancho Santa Fe, Calif., in 1951 after selling his Rocky Mountain interests for more than $11 million. He entered the industry as a roughneck in the Texas oil fields. He later set up his drilling firm, Fred M. Manning Co., in Denver. His most important strikes were in the early 1940's in Wyoming's Elk Basin and in North Texas. The company at one time was the third largest drilling firm in the nation. Manning also organized Coastal Drilling Co. in California. Manning's two sons are active in the drilling business. Fred M., Jr., is president of Fred M. Manning Co., Denver, and Robert L. heads Robert L. Manning Co., Denver. A nephew, J. E. Manning, is president of Mountain States Drilling Co., Denver.

M. J. Graham, 64, Hominy, Okla., independent operator, died October 31 in a Miami, Okla., hospital.

Samuel E. Furman, retired district supervisor for Ohio Oil Co., died recently in Los Angeles. Furman retired in 1949.

Howard A. (Red) Grimes, 56, retired director of Creole Petroleum Corp., died October 27 in Dunedin, Fla. He was general manager of International Petroleum Corp., Ltd., in Peru from 1945-49, and became a director of Creole in 1951. He retired 5 years ago.

Locksley Simon (Roxy) Lantz, 74, superintendent of Continental Oil Co.'s Tulsa division before becoming an oil lease broker in 1929, died October 31 at his home in Tulsa. He had been in the oil business since 1904.

James Charles O'Mara, Tulsa, retired head of O'Mara Drilling Co., Bristow, Okla., died November 1 in Bristow. He had lived in Tulsa since retiring in 1930.

Edward I. Newblock, 82, Tulsa independent producer, died November 4 at his farm near Jay, Okla. Newblock was one of the original partners in Humphreys Oil Co., which discovered Mexia field in Texas. The company was sold to Pure Oil Co. in 1933.

it's our pleasure!

Niels Kjeldsen

T. A. O'Donnell

John A. Baines

A. C. P. Jones

The headline-making development of Canada's oil riches since the Leduc discovery eleven years ago has been a story of cooperation between Americans and Canadians. The Oil and Gas Department of Canada's First Bank in Calgary has been "headquarters" for many U. S. oil men operating in Canada. With more than 250 branches spanning the oil provinces, the B of M has served the petroleum interests of U. S. oil men everywhere north of the border.

That's why *it's our pleasure* for the Bank of Montreal representatives to be seeing you at this year's A. P. I. Convention. They are staying at the Palmer House and will welcome the opportunity of talking Canadian oil with you.

Bank of Montreal representatives at the A.P.I.:

JOHN A. BAINES, *Manager*, Oil & Gas Department, Calgary, Alta.
NIELS KJELDSEN, *Special Representative*, Chicago
T. A. O'DONNELL, *Special Representative*, Chicago
A. C. P. JONES, *Special Representative*, Calgary, Alta.

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Look for smaller distillate gains

BY JOHN C. CASPER

DISTILLATE DEMANDS trends are changing, and these changes will influence forecasts of distillate demand over the next few years.

Here are some of the general trends for distillate sales in this country:

. . . The portion of distillate fuel that is sold as heating oil is declining.

. . . There has been a remarkable growth in consumption of diesel fuel over the past 20 years, but annual percentage gains have been shrinking for the past few years.

. . . Increased sales of natural gas have cut into the home-heating market.

. . . Improvement in home insulation and oil burner efficiency has reduced fuel consumption for a typical house.

. . . Most coal furnaces have been replaced by oil or gas. Conversions will be scarce in the future.

These last three add up to smaller percentage gains in sales of distillate for heating.

The chart on the right gives a picture of annual percentage changes in domestic sales of heating oils. There have been only three decreases on a yearly basis since information on sales of heating oils was first published by the Bureau of Mines in 1936. Two of these low points came during World War II and the other in 1949. The largest percentage gain was in 1947 when postwar expansion and cold weather added 28.3% to distillate sales for heating.

The broken line in the chart shows the slight downward trend in the annual percentage gains by distillate heating oils. This does not mean that actual sales of distillate are declining but that the percentage gains will not be as large as they have been in past years. Gains were averaging above 10% a year in the late thirties but can be expected to be down near 5% in the future.

Also, the sales trend for diesel fuels shows a tendency toward smaller annual percentage gains for recent years. There has been only one 10% gain in the past 5 years with the average less than 6%. Diesel sales in 1957 were up only 1.7%.

Since diesel and heating oils account for about 90% of total distillate consumption, the trend for total distillate will be toward small annual percentage gains.

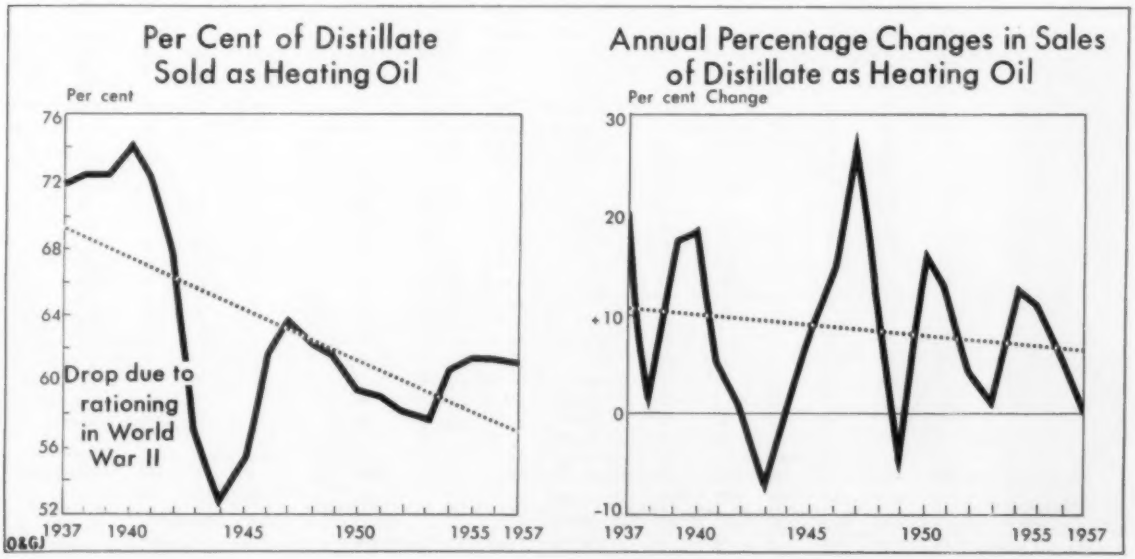
However, the low distillate demand for October can't be charged to the long-term trend. Most of the decrease was due to warm weather this fall and the high level of demand in October last year.

Domestic demand for distillate in October 1957 was up 9.9% from October 1956, but the average for the year was up less than 0.5%. Despite the loss in October, the gain this year will be about 4.5% if weather is near normal in November and December.

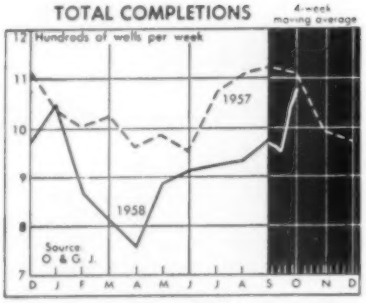
Distillate sales for the first quarter next year will show a gain of about 4.0% over the first quarter of this year.

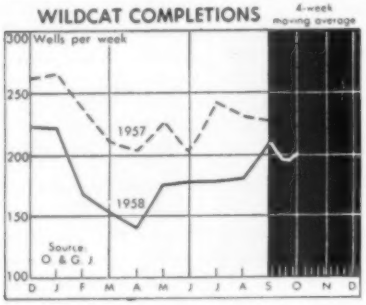
A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,915,830	UP	9,205	UP	198,000
Crude stocks	254,993,000	UP	962,000	DOWN	27,415,000
Completions	1,035	DOWN	284	UP	12
Refinery runs	7,752,000	DOWN	1,000	UP	172,000
Gasoline stocks	168,476,000	UP	126,000	DOWN	12,934,000
Kerosine stocks	32,374,000	UP	491,000	DOWN	1,890,000
Distillate stocks	166,414,000	UP	2,498,000	DOWN	8,715,000
Residual stocks	67,580,000	DOWN	274,000	UP	8,237,000
Four-product stocks	434,844,000	UP	2,841,000	DOWN	15,302,000
Total imports	1,901,300	UP	475,700	UP	314,900



DRILLING





Active Rotary Rigs*

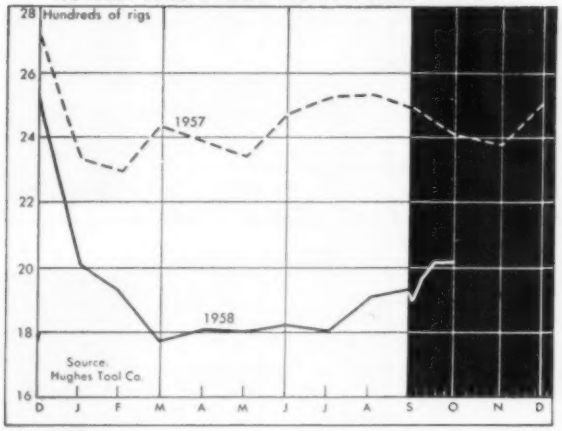
	11-3-58	10-27-58	11-4-57
Alabama	13	13	6
Arkansas	24	29	26
Arizona	2	2	1
California	83	73	82
Colorado	29	27	54
Florida	1	1	1
Georgia			
Idaho			
Illinois	54	55	60
Indiana	10	11	5
Iowa	3	3	2
Kansas	153	146	153
Kentucky	10	14	10
Louisiana	315	311	394
North	37	36	58
South	244	242	259
Offshore	34	33	77
Maryland	1	1	1
Michigan	10	11	13
Missouri	1	1	
Montana	28	28	38
Mississippi	53	59	48
Nebraska	25	20	29
Nevada			
New Mexico	91	84	138
New York	2	2	
North Dakota	31	29	42
Ohio	4	4	1
Oklahoma	237	223	261
Oregon			
Pennsylvania	8	9	13
South Dakota	1	1	2
Texas	717	744	909
South-Gulf	131	151	163
Offshore			6
North-East	163	167	(†)
West Central	249	255	(†)
West	174	171	(†)
Tennessee			
Utah	39	41	57
Washington	1	1	1
West Virginia	6	5	3
Wyoming	63	66	82
Virginia			
Total U. S.	**2,015**	2,014	2,432
Western Canada	144	147	163
Eastern Canada	3	3	2
Grand Total	2,162	2,164	2,597

*Hughes Tool Co. †Comparisons not available due to change in method of reporting.

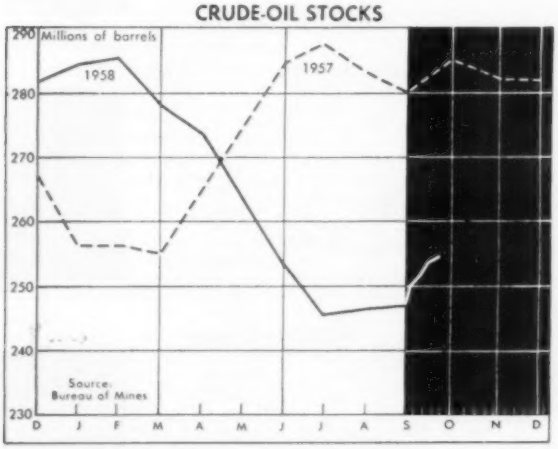
WEEKLY WELL COMPLETIONS . . . WEEK ENDED NOVEMBER 1, 1958

	Total wells							Cumulative		Total wildcats					Cumulative	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1958	1957	Total	Crude	Cond.	Gas	Dry	1958	1957
Alabama	2	2	0	0	0	0	23,133	64	69	0	0	0	0	0	24	23
Arkansas	25	14	0	1	10	0	84,323	671	936	4	0	0	0	4	138	172
California	21	10	0	1	10	0	89,396	1,276	1,853	10	0	0	1	9	313	443
Colorado	26	2	0	2	22	0	145,967	710	721	17	0	0	0	17	414	473
Illinois	49	21	0	3	24	1	112,399	1,889	2,268	10	0	0	1	9	379	535
Indiana	30	5	0	1	24	0	41,938	702	568	14	1	0	0	13	256	112
Kansas	90	44	0	6	39	1	303,451	3,227	3,552	15	1	0	0	14	673	702
Kentucky	50	23	0	3	24	0	81,229	1,451	1,264	13	1	0	0	12	146	254
Louisiana	71	34	1	5	31	0	423,124	2,876	3,256	7	1	0	0	6	429	575
North	43	19	0	4	20	0	135,911	1,106	1,200	5	0	0	0	5	186	161
South	24	12	1	1	10	0	252,787	1,409	1,468	2	1	0	0	1	219	338
Offshore	4	3	0	0	1	0	34,426	361	588	0	0	0	0	0	24	76
Michigan	13	6	0	2	5	0	41,826	367	379	6	1	0	1	4	122	132
Mississippi	13	6	0	0	7	0	130,293	328	329	4	0	0	0	4	148	166
Montana	3	1	0	0	2	0	20.773	276	350	1	0	0	0	1	110	138
Nebraska	13	3	0	0	10	0	77,802	601	753	6	0	0	0	6	282	412
New Mexico	30	19	0	3	8	0	102,993	1,628	1,812	6	1	0	0	5	226	236
West	13	8	0	3	2	0	32,159	796	770	1	0	0	0	1	90	91
East	17	11	0	0	6	0	70,834	832	1,042	5	1	0	0	4	136	145
New York	12	5	0	0	2	5	19,515	457	390	2	0	0	0	2	41	7
North Dakota	9	6	0	0	3	0	41,671	393	239	2	0	0	0	2	124	108
Ohio	20	8	0	7	4	1	57,914	858	949	1	1	0	0	0	13	16
Oklahoma	101	48	3	4	42	4	362,393	5,283	5,406	9	2	0	0	7	717	636
Pennsylvania	1	0	0	1	0	0	5,078	474	519	1	0	0	1	0	17	41
Texas	401	225	15	11	141	9	1,635,627	15,033	18,315	65	4	1	2	58	3,064	4,344
Dist. 1	23	15	0	0	8	0	55,312	835	1,049	4	0	0	0	4	327	359
Dist. 2	13	2	0	1	10	0	69,933	628	652	5	0	0	0	5	165	228
Dist. 3	36	18	4	1	13	0	214,337	1,075	1,425	8	1	1	0	6	242	399
Dist. 4	35	9	4	2	20	0	146,512	980	1,174	7	0	0	0	7	293	376
East	33	20	3	0	10	0	152,500	1,030	1,150	7	0	0	0	7	284	329
Dist. 7-B	55	28	0	1	26	0	147,630	2,067	2,477	8	0	0	1	7	564	849
West	106	79	2	0	20	5	491,240	4,277	5,182	12	0	0	0	12	601	732
Dist. 9	70	39	0	1	26	4	211,111	3,040	4,004	8	2	0	0	6	482	979
Dist. 10	30	15	2	5	8	0	147,052	1,101	1,202	6	1	0	1	4	106	93
Utah	24	19	0	0	4	1	140,597	330	200	1	0	0	0	1	75	101
West Virginia	15	2	0	12	1	0	39,864	630	587	0	0	0	0	0	15	29
Wyoming	13	1	0	2	10	0	78,684	627	722	8	0	0	0	8	203	247
Mis. (Mo., Wash.)	3	0	0	0	3	0	11,466	82	116	3	0	0	0	3	72	99
Total U. S.	**1,035**	504	19	64	426	22	4,071,456	40,233	45,553	**205**	13	1	6	185	8,001	10,001
Total prev. wk.	1,319	828	10	65	392	24	3,748,499			192	17	3	7	165		
Cum. 1958	40,233	19,809	934	3,008	15,421	1,061	164,028,701			8,001	772	134	218	6,877		
Western Canada	59	35	0	4	19	1	328,709		2,570	19	2	0	2	15		726

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	10-25-58	10-18-58	10-26-57
Pennsylvanian	2,724	2,767	3,155
Other Appalachain	1,529	1,809	1,771
Illinois, Indiana, Michigan	9,540	9,356	10,983
Nebraska and North Dakota	2,783	2,920	2,900
Kansas	10,414	9,708	10,264
Oklahoma	17,044	17,107	20,933
Arkansas	1,853	1,990	2,748
Louisiana	16,425	17,306	19,421
North	2,842	2,933	3,222
South	13,583	14,373	16,199
Mississippi, Alabama, Florida	2,727	2,551	2,757
New Mexico	7,736	8,212	9,905
Texas	110,069	109,819	125,702
East Texas	8,176	8,066	9,638
West Texas	54,130	53,246	58,522
Texas Gulf	19,819	19,617	24,245
Other Texas	27,944	27,890	33,297
Wyoming	14,087	13,196	14,531
Other Rocky Mountain	9,452	9,399	6,394
California	33,298	33,134	32,382
Foreign	†15,312	15,757	18,562
Total	**254,993**	254,031	282,408

*Bureau of Mines. †Includes 4,939,000 bbl. in California.

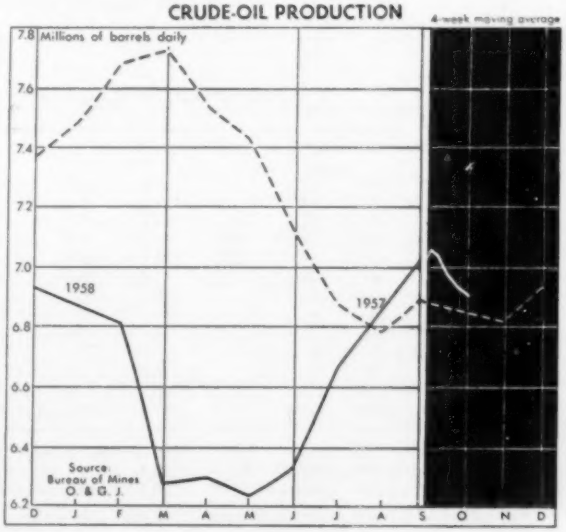
DAILY AVERAGE PRODUCTION FOR WEEK

	November 1, 1958 Crude oil	Lease condensate	Total	Oct. 25 total
Alabama	16,230	.....	16,230	16,300
Arkansas	79,600	150	79,750	79,650
California	848,200	.....	848,200	849,400
Colorado	132,000	.....	132,000	131,200
Eastern	47,000	.....	47,000	44,500
Florida	1,200	.....	1,200	1,200
Illinois	221,100	.....	221,100	217,200
Indiana	32,300	.....	32,300	32,900
Kansas	†343,000	.....	†343,000	†337,700
Kentucky	45,500	.....	45,500	41,700
Louisiana	809,400	90,175	899,575	899,700
North	109,400	3,775	113,175	113,300
South	700,000	86,400	786,400	786,400
Michigan	25,200	.....	25,200	25,200
Mississippi	105,100	4,400	109,500	109,500
Montana	77,100	.....	77,100	77,000
Nebraska	58,000	.....	58,000	57,800
Nevada	100	.....	100	100
New Mexico	277,100	6,000	283,100	283,100
North Dakota	32,100	.....	32,100	19,000
Oklahoma	†544,300	.....	‡544,300	†561,800
Texas	2,620,000	63,200	2,683,200	2,683,200
Dist. 1	47,000	500	47,500	47,500
Dist. 2	116,000	8,300	124,300	124,300
Dist. 3	342,000	31,000	373,000	373,000
Dist. 4	194,000	7,800	201,800	201,800
Dist. 5	31,000	400	31,400	31,400
Dist. 6	120,000	6,800	126,800	126,800
East Texas Field	149,000	.....	149,000	149,000
Dist. 7-B	144,000	50	144,050	144,050
Dist. 7-C	138,000	4,050	142,050	142,050
Dist. 8	1,022,000	2,000	1,024,000	1,024,000
Dist. 9	210,000	1,500	211,500	211,500
Dist. 10	107,000	800	107,800	107,800
Utah	108,200	.....	108,200	109,500
Wyoming	329,000	.....	329,000	328,800
Others	‡175	.....	‡175	‡175
Total U. S.	6,751,905	163,925	**6,915,830**	6,906,625
Change from prev. week—up			**9,205**	
Canada	†446,600	.....	†446,600	†462,000

Total U. S. production—Jan. 1-Nov. 1 ..... 2,019,096,060 bbl.
Same period last year (crude plus cond.) ..... *2,204,312,965 bbl.

*Includes 42,621,215 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Washington.

CRUDE-OIL PRODUCTION



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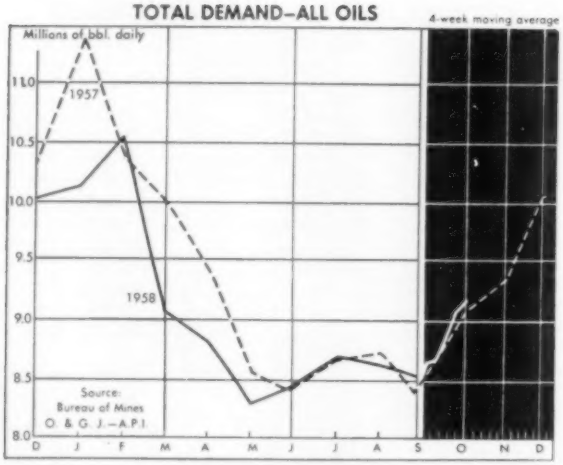
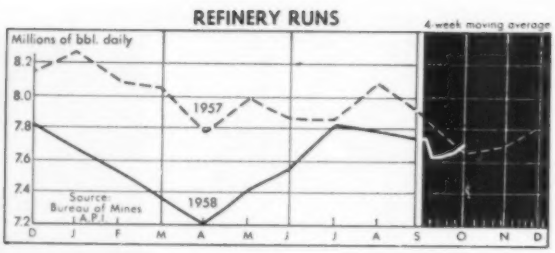
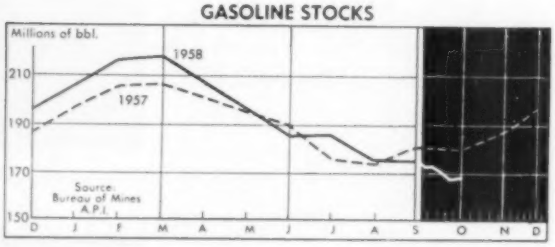
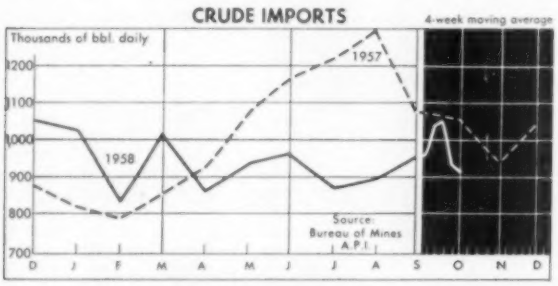
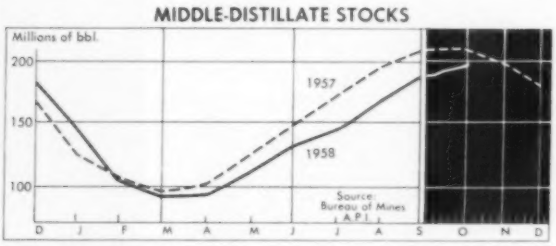
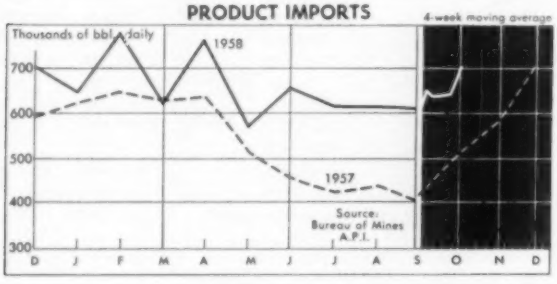


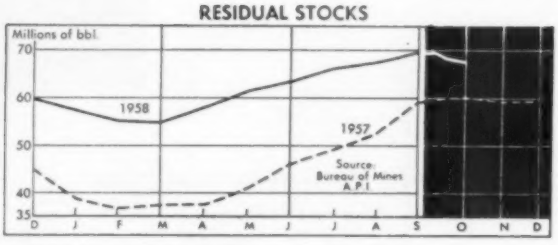












API REFINERY REPORT—OCTOBER 31, 1958

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, October 1957 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,105	465.4	24.0	344.7	182.7	39,767	12,101	59,693	13,474	1,088	487.2	24.5	306.7	166.6
Appalachian:														
Dist. 1	94	45.0	4.0	20.6	12.4	4,406	661	3,872	273	108	46.8	4.6	23.9	8.7
Dist. 2	106	54.7	5.3	17.6	17.2	2,211	527	1,543	177	109	54.8	5.6	17.9	11.5
Ind., Ill., Ky.	1,397	704.0	69.1	266.6	182.0	29,149	8,069	30,211	5,556	1,367	730.5	69.0	275.0	161.3
Minn., Wis., Dak.	90	46.2	7.4	29.4	4.6	6,694	1,453	8,780	499	82	38.9	1.6	22.6	7.2
Okla., Kans., Mo.	652	385.7	10.2	168.7	24.6	15,709	1,820	13,327	1,157	709	396.9	11.8	167.8	30.7
Inland Texas	301	195.7	6.7	52.7	22.0	6,433	428	2,269	2,121	256	206.3	7.6	48.5	26.4
Texas Gulf Coast	1,836	969.3	113.3	529.7	197.7	22,543	3,443	18,849	8,092	1,792	924.3	97.7	432.3	208.6
La. Gulf Coast	650	386.4	55.1	157.2	53.1	10,196	1,893	7,774	1,419	614	355.5	31.9	164.4	42.2
N. La. and Ark.	100	37.5	5.0	21.3	6.1	4,351	1,155	2,468	104	85	35.5	5.7	18.8	5.6
Rocky Mountain:														
New Mexico	20	11.3	...	6.4	2.2	431	42	132	51	28	15.4	0.5	5.5	3.5
Other Rocky Mt.	273	126.7	2.2	60.7	32.9	4,173	357	2,964	933	261	128.2	3.5	61.8	34.2
West Coast	1,128	486.4	4.0	187.1	280.1	22,413	425	14,532	33,724	1,151	474.8	1.5	160.1	345.2
Oct. 31, 1958	7,752	3,914.3	306.3	1,862.7	1,017.6	168,476	32,374	166,414	67,580	7,650	3,895.1	265.5	1,705.3	1,051.7
Oct. 24, 1958	7,753	3,935.1	360.4	1,724.4	1,032.4	168,350	31,883	163,916	67,854	.....	.....	.....	.....	.....
Nov. 1, 1957	7,580	3,860.6	271.7	1,725.3	1,050.6	181,410	34,264	175,129	59,343	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (89 octane)	11.50-11.625
Premium (99 octane)	14.50-14.625
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.25
Regular (92 octane)	10.50
Premium (97 octane)	11.625
Premium (98 octane)	11.75
California (rack) (Los Angeles):	
Regular (88 octane)	12.2-13.7
Premium (94 octane)	13.2-15.5
Premium (98 octane)	14.2-16.5
Caribbean area (cargoes):	
Regular (87 octane)	9.875
Premium (97 octane)	11.625

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.5
Breckenridge:	
Grade 26-70	4.0

*If 26-70 natural is considered as 100%, prices for lower-vapor-pressure grades increase 2.5% for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	10.00
Diesel oil (58 d.i. and above)	9.75
Distillate No. 1	9.75
Distillate No. 2	9.00
Gulf Coast (cargoes):	
Kerosine 41-43	9.125
Distillate No. 2	8.625
New York Harbor (barges):	
Kerosine 41-43	10.20
Distillate No. 2	9.70
Diesel fuel, 48-52 d.i.	10.05
Caribbean area (cargoes):	
Distillate No. 2	8.625

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank car	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
★Residual fuel (max. 1% S)	$1.50
Gulf Coast (cargoes):	
Bunker C fuel	$2.00
New York Harbor (barges):	
Bunker C fuel	$2.37
Caribbean (cargoes):	
Bunker C	$2.00
California (rack):	
Bunker C fuel, Los Angeles	$2.10

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 pp., 95 v.i.	23.0
200 vis. neutral oil, solvent refined, 0-10 pp., 95 v.i.	20.5
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	22
200 vis. neutral (180° at 100°), 25 p.t.	21

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$1.86	....	....	....	....
15-15.9	1.95	....	....	....	$1.81
16-16.9	2.04	....	....	....	1.86
17-17.9	2.13	....	....	....	1.91
18-18.9	2.23	....	....	....	1.96
19-19.9	2.32	....	....	....	2.01
20-20.9	2.41	$2.75	....	$2.62	2.06
21-21.9	2.50	2.77	....	2.64	2.11
22-22.9	2.60	2.79	....	2.66	2.16
23-23.9	2.69	2.81	$3.44	2.68	2.21
24-24.9	2.78	2.83	3.46	2.70	2.26
25-25.9	2.87	2.85	3.48	2.72	2.31
26-26.9	2.96	2.87	3.50	2.74	2.36
27-27.9	3.06	2.89	3.52	2.76	2.49
28-28.9	3.11	2.91	3.54	2.78	2.54
29-29.9	3.16	2.93	3.56	2.80	2.59
30-30.9	3.22	2.95	....	2.82	2.63
31-31.9	3.27	2.97	....	2.84	2.67
32-32.9	3.33	2.99	....	2.86	2.71
33-33.9	3.38	3.01	....	2.88	2.75
34-34.9	3.44	3.03	....	2.90	2.79
35-35.9	3.49	3.05	....	2.92	2.83
36-36.9	3.55	3.07	....	2.94	2.87
37-37.9	3.60	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40-44.9	....	3.15	....	3.02	2.95

*Includes some Oklahoma (sweet), part of Kansas, North Dakota, West Texas (sweet). Other Oklahoma sweet selling 14-31 cents under this schedule. †Low cold test crude. ‡Sour.

Effective dates of broad changes: California, 9-30-58; East of California, January 3-10, 1957; Pennsylvania Grade, 6-18-58.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Ville Platte	3.30
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	3.90
Middle District	3.72
Southwest Pennsylvania	3.43
West Virginia	3.25
Buckeye Grade	3.25
Illinois Basin	3.00
Canada:	
Leduc-Woodbend	2.67
Redwater (Alta.)	2.56
Smiley (Sask.)	2.33
Pembina	2.52

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26°-26.9°, Amuay*	2.55
Quiriquire, 16.0°-16.4°, Caripito	2.15
Lagunillas heavy, flat, Las Piedras*	2.10
Las Piedras*	2.10
Bachequero, flat, 15°-16°, Las Piedras*	1.93

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$2.12
Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Ababan	1.99
Iraq, 35.0°-35.9°, Fao	1.98
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0°-41.9°, Umm Said	2.23
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.49
Iraq, 36.0°-36.9°, Tripoli, Banias	2.49
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

TANKER RATES PER LONG TON
(Latest reported spot fixtures)

★ Carib.-U.S.N.H., clean (ATRS —20%	$2.20
★ Carib.-U.S.N.H., dirty (USMC —60%	1.08
★ Carib.-Sweden, dirty (Scale—47.5%) (18s. 4d.)	2.57
★ P.G.-Lisbon dirty (Scale—45%) (28s. 9d.)	4.03

SELECTED MONTHLY DATA

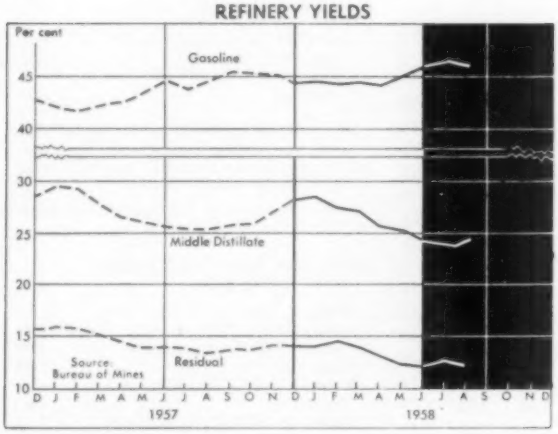
SUPPLY AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

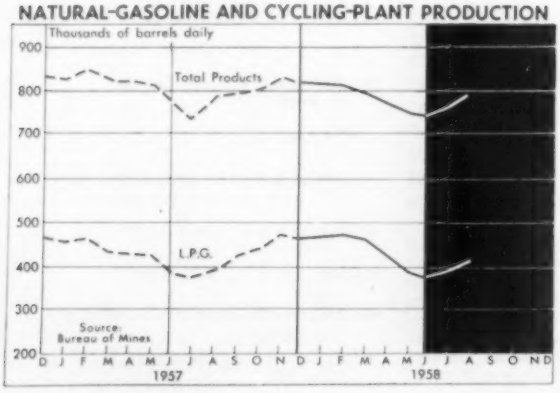
	Total demand	Refinery production	Stocks end of period†
GASOLINE			
October 1958*	4,090	3,870	168,600
September 1958*	4,060	3,960	172,800
August 1958	4,272	4,082	177,351
November 1957	3,705	3,864	187,141
October 1957	3,937	3,895	180,902
KEROSINE			
October 1958*	290	325	32,100
September 1958*	200	280	31,200
August 1958	172	265	28,662
November 1957	384	324	32,696
October 1957	334	266	34,384
DISTILLATE			
October 1958*	1,465	1,785	166,000
September 1958*	1,280	1,770	155,700
August 1958	1,109	1,706	139,862
November 1957	2,096	1,734	166,763
October 1957	1,622	1,705	176,388
RESIDUAL			
October 1958*	1,560	990	67,100
September 1958*	1,340	985	69,000
August 1958	1,363	961	67,230
November 1957	1,623	1,069	59,622
October 1957	1,471	1,052	60,025

*Preliminary. †Thousands of barrels.

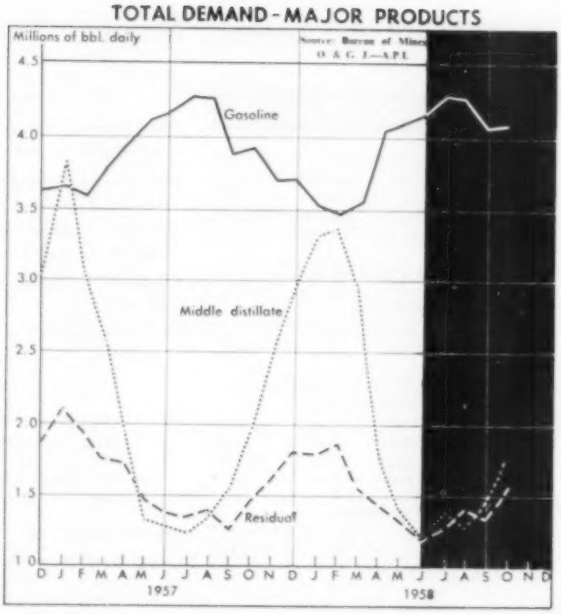
REFINERY YIELDS



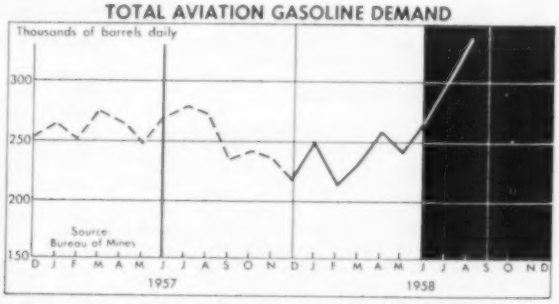
NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION



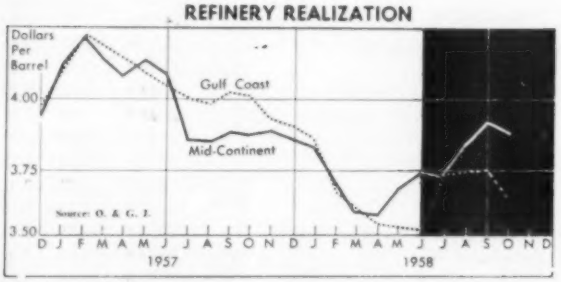
TOTAL DEMAND - MAJOR PRODUCTS



TOTAL AVIATION GASOLINE DEMAND



REFINERY REALIZATION



REFINERY REALIZATION

	October* 1958	September* 1958	August 1958	October 1957
Mid-Continent	$3.87	$3.94	$3.88	$3.87
Gulf Coast	3.66	3.75	3.75	4.01

*Preliminary.

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

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All API Youngstown seamless in perfect condition.

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1—Horiz. welded Butane tank 8' x 40', ½" shell, heads may be heavier dished.
1—Horiz. welded Butane tank 11'6" dia. x 19' shell ½" heads dished, may be heavier.
1—Horiz. welded steel tank 8' dia. x 40', 13/16" shell, 1¼", dished heads.
1—Horiz. Propane welded steel tank 6' dia. x 28', Code U-69, 200# pressure.
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14" x 40' Tower, 160#
18" x 23' Tower, 160#
24" x 28' Tower, 550#

8' x 75', 20 Tray, 25#
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24" x 45', 24 Tray
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HELP WANTED

WANTED: PETROLEUM ENGINEER
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OPERATIONS MANAGER: Age 43 with 24 years foreign and domestic experience capable and experienced in co-ordinating drilling, production, field engineering, and field geology. Good organizer and at best on difficult jobs. Background includes experience as district manager of drilling company where contact work as well as active management was required. Top references. Box K-951, The Oil and Gas Journal, Tulsa, Oklahoma.

REGISTERED PETROLEUM ENGINEER—38, Texas A.&M. graduate; 14 years diversified experience in drilling, completions, workovers, both oil and gas production, and gas and oil reserve estimates. Includes 14 months specialized training in electric log interpretation. Bulk of experience in Texas Gulf Coast. Now employed in South America (2½ years) as chief engineer for major. Sound reason for leaving. Excellent references. Desire to live in Houston but will travel anywhere in world. Box K-952, The Oil and Gas Journal, Tulsa, Oklahoma.

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PIPELINE ENGINEER: Graduate mechanical engineer. Ten years experience: products and gas systems, all phases pipeline; desires responsible position with established company in U. S. Box K-916, The Oil and Gas Journal, Tulsa, Oklahoma.

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CHEMIST—33, 7 years production—Refinery Laboratory experience—Spanish, English. Resume on request. Box K-942, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICS SUPERVISOR: Eight years experience in Texas, Louisiana, Mississippi, Rocky Mountain area, Australia and Venezuela. Box K-928, The Oil and Gas Journal, Tulsa, Oklahoma.

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FOR DRILLING DEALS in Texas, contact Ogden Oil Company, P. O. Box 464, Ph. EL 2-3352, Taylor, Texas.

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LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Denver, Colorado. Notice is hereby given that 1563.85 acres of land in three parcels within the known geologic structure of South McCallum Field, Jackson County, Colorado, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 2 p.m., M.S.T., December 19, 1958, when bids will be opened. Details of the lease offering, how and where to submit bids, and forms, may be obtained from the Bureau's Land Office, P. O. Box 1018, Denver, Colorado. John L. Rankin, Manager.

EQUIPMENT MEN . . . in the News

William I. Spencer assigned

W. I. Spencer

. . . general supervision of the petroleum department of The First National City Bank of New York. He succeeds J. E. Warren, formerly senior vice president. As administrative head of the department Spencer directs the activities of a group of petroleum engineers, geologists, and lending officers, who render financial counsel to the oil industry. Also announced is the appointment of Robert L. Huston as assistant cashier in the petroleum department. He joined the bank in 1956.

New representative named

. . . by Graver Water Conditioning Co. G. M. Wallace & Co. was named engineering representative for the Rocky Mountain-Intermountain area. They will handle Graver's complete line of equipment. Four Wallace offices staffed by a group of power and liquid treatment specialists are located within an area offering convenient and rapid service to industry. Home office is in Denver.

E. S. Odum named director

E. S. Odum

. . . of Delta Tank Manufacturing Co., Inc.'s newly-created field erection division, according to H. S. Phillips, president. Prior to joining Delta, Odum was with Tank & Refinery Maintenance Corp. This new division will assemble and erect products of the pressure vessel division at customer refineries and petrochemical plants.

J. T. Teed appointed

. . . by Brown Instruments Division of Minneapolis-Honeywell Regulator Co., as market manager for petroleum industry instrumentation. He joined Honeywell in 1950 as sales engineer in the Tulsa district office.

New supply company formed

. . . in Sydney, Australia. Oilfield Supply Pty., Ltd., is the first and only supply company in Australia now offering over-the-counter sales to the industry. The announcement came from G. G. Goddard, secretary of Oilfield Supply.

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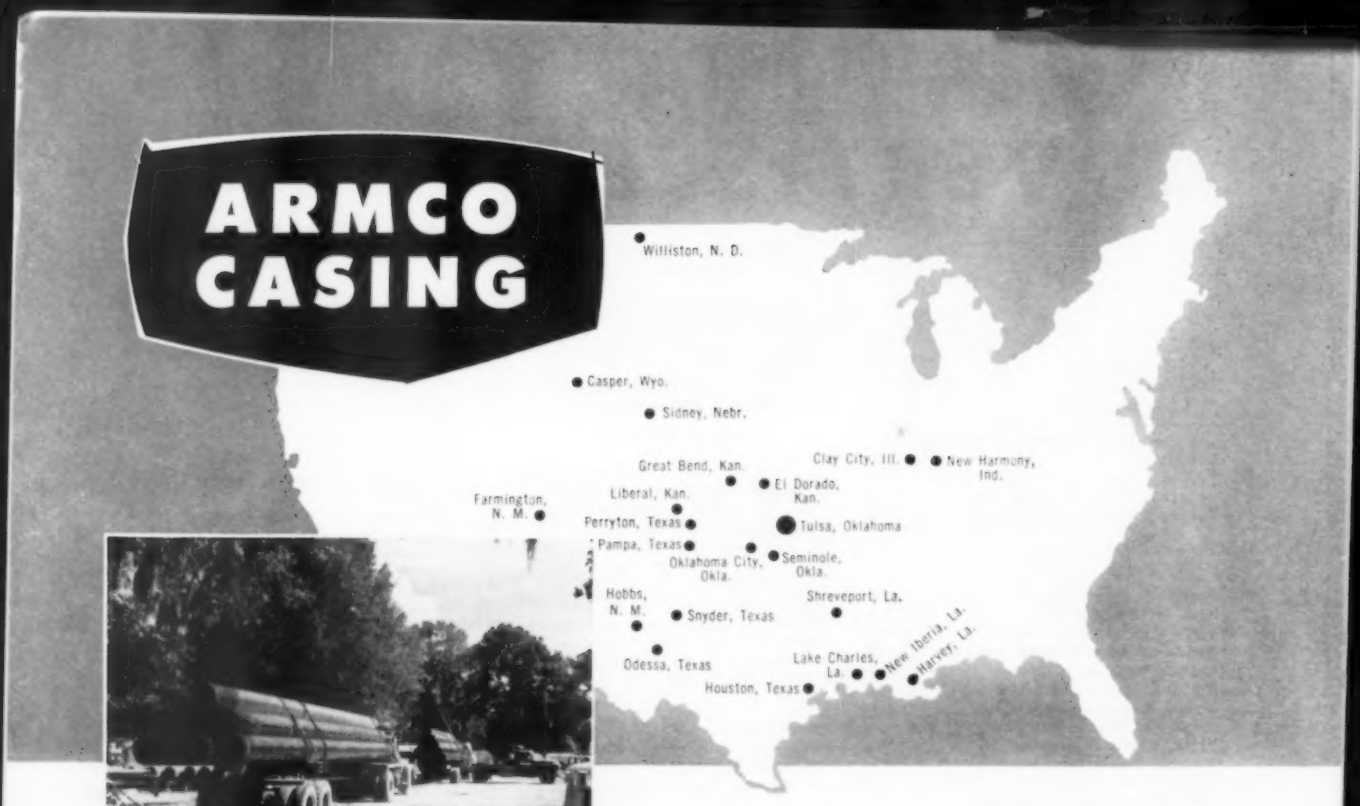

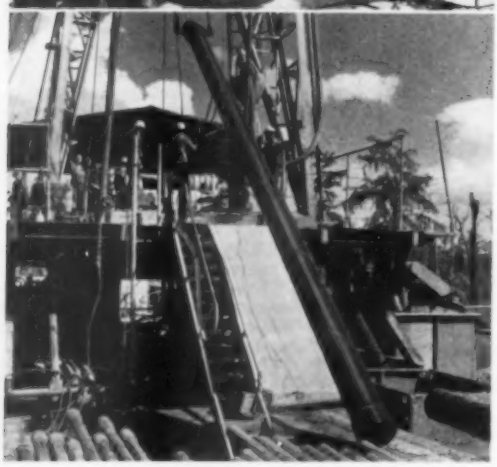

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2 Gallup Sand, Northwestern N.M.
3 Triassic "D", British Columbia
4 Canyon Sand, North Texas
5 Wilcox Sand, South Texas
6 Rodessa Sand, Alabama

Dowell Guide To Fracturing

1 Clear Fork Lime, West Texas: This limestone contains varying amounts of dolomite and salt. Duofrac* has been quite successful — using large volumes of weak acid as a sand carrier. This fluid attacks both the formation and salt crystals. 50,000-gallon treatments, injection rates up to 50 bpm and ball sealers, are common. After treatment, some wells potential over 300 bopd.

2 Gallup Sand, Northwestern New Mexico: This core is from one of the better Bisti wells. Permeability is often less than one millidarcy and porosity ranges from zero to 12 per cent. Before treatment, wells often will not produce commercially. After a 500-gallon spearhead of Mud Acid, followed by Sandfrac* — using 50,000 gallons of lease crude and 50,000 pounds of sand at 30 to 40 bpm — many wells potential up to 600 bopd.

3 Triassic "D", British Columbia: This sandstone gas pay frequently produces commercially before fracturing. However, many operators have increased potentials by fracturing with Sandfrac*, using diesel oil with 100 pounds of FLA (Fluid Loss Agent) per 1,000 gallons. Treatments usually consist of 20,000 gallons fluid and 20,000 pounds sand down tubing at about 8 bpm. Results vary widely — with increases from two to 25 mmcfd being reported.

4 Canyon Sand, North Texas: Wells completed in this Pennsylvanian age formation often give high initial production (80 to 300 bopd). However, a steep decline curve to 8 or 10 bopd in six to nine months makes fracturing advisable. Usual treatment is a spearhead of 500 to 1,000 gallons of a special acid followed by Sandfrac* — using 10,000 to 20,000 gallons lease crude and 1½ pounds sand per gallon. **FLA*** (Fluid Loss Additive) is often used. Treatment generally increases production and reduces decline rate.

5 Wilcox Sand, South Texas: This shale-streaked sandstone is found from 8,000 to 11,000 feet. Bottom-hole temperature is high — from 225° to 300°F — and pay zones range from 15 to 200 feet in thickness. Stratafrac* is often used because it is designed to clean up fast and suspends sand well at high temperatures. Treatments range from 6,000 to 12,000 gallons injected at 3 to 5 bpm, with 1 pound of sand per gallon. Production frequently increases from less than 10 to 70 bopd through choke.

6 Rodessa Sand, Alabama: The Citronelle Field produces from two sections of dirty sand varying in depth from 10,400 to 11,600 feet. Super Mud Acid, with an added silicate control agent, is used to dissolve and shrink clays. Petrojel*, using 20,000 to 30,000 gallons jelled crude with 20,000 to 40,000 pounds sand is usually recommended. Ball sealers are frequently used to spread the effect of the treatment. Many wells then potential over 300 bopd.

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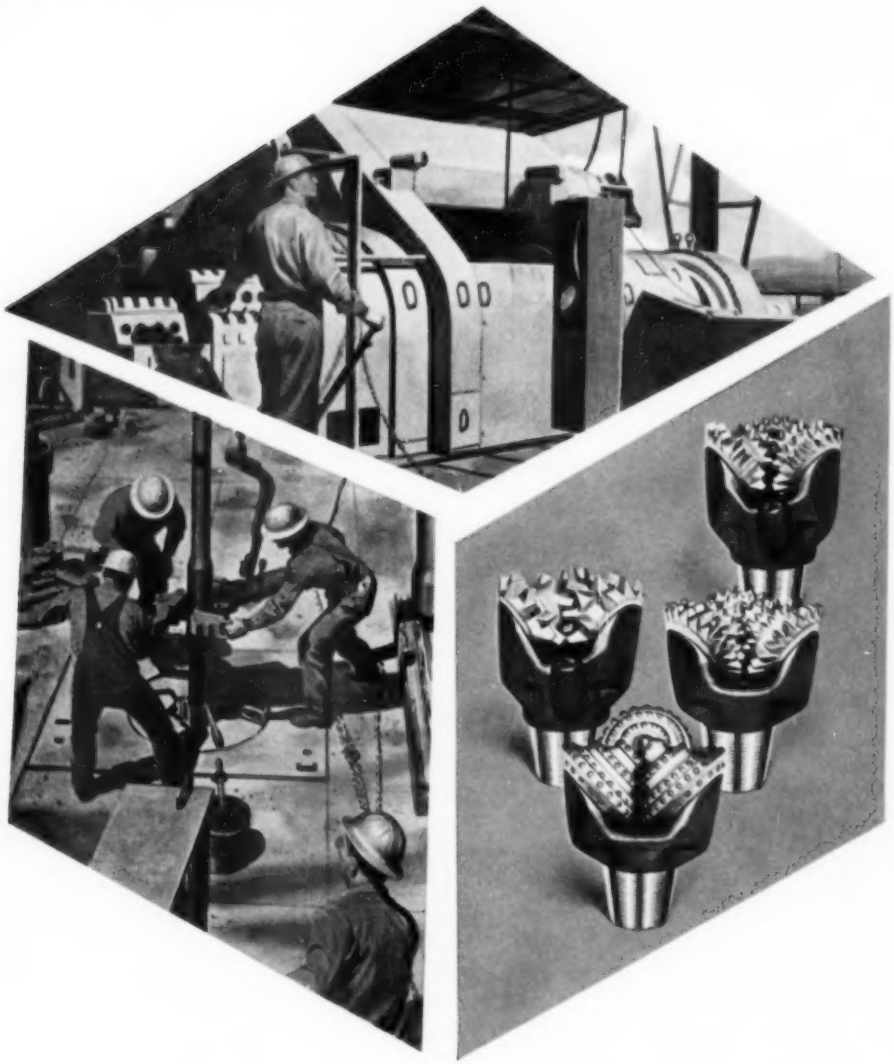

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